

# THE IRON AGE

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## Iron and Steel Resources of Russia

Past and Future Needs—Capacity  
for Iron and Steel Production—  
Location and Size of Ore Deposits

**D**ATA on estimated large future requirements of Russia for iron and steel products and the country's facilities for supplying the demand were given by P. Kovaloff, mining engineer, at a meeting of the Association of Russian Engineers for Relief of Russia, held some time ago in New York. Mr. Kovaloff for years was assistant director of a mining department in Russia and in this position had the opportunity to become thoroughly familiar with the country's iron industry. The address is given largely in full below.

Notwithstanding the rapid development of the iron industry in Russia during late years, especially from

1909 to 1913, when the yearly output of pig iron increased from 3,240,000 tons to 5,040,000 tons, the amount of iron consumed per capita in Russia was considerably behind that of the other European countries. While for Germany this amount was 319.8 lb., for Great Britain 269.1 lb., and France 245.7 lb., the corresponding figure for Russia, even in the record year, was only 62.4 lb. The reason for this was the slow development of industries in general; little activity in railroad building, and particularly the insufficient buying power of the general masses.

A comparison of the consumption of iron per capita



in Russia with that in other countries gives an idea of that iron hunger which the country felt constantly. The occasional crises of the iron industry were caused not by overproduction, but by the absence in the general masses of the means wherewith to buy.

#### Increased Requirements Foreseen

At the present time there are all the prerequisites for a change in the situation. First of all, the state of prosperity of the rural population has considerably improved. Farm products, though in meagre quantities, still continue to go into cities at high prices. With the re-establishment of the circulation of merchandise the demand of the rural population for the products of the iron and steel industry will be an entirely different one from that observed previously. The repairs to worn-out farming equipment coupled with the demand for new and improved implements will call for an enormous quantity of iron and steel.

An increased demand must also be expected from industries. The redistribution of the population, accompanied by the large flow to undeveloped parts of Russia, particularly Siberia, will necessarily cause the establishment of new industrial enterprises, whose requirements will be far in excess of the normal demand.

On the railroads' part, there is foreseen a much larger demand than existed before the war. A development at the rate of 5000 versts (3314 miles) of new lines a year presents itself as an urgent necessity without which any improvement in the economic situation of Russia is unthinkable. Also enormous quantities of steel will be required for the replacement of rails and rolling stock.

City building had been almost entirely stopped during the war. The population of the small cities in Central Russia, as well as the city population of Siberia and of other regions not occupied by Bolsheviks, has considerably increased, mainly on account of the refugees. It must be expected, therefore, that an intense building activity will take place in these cities as soon as an opportunity presents itself. This again will create a demand in excess of that of normal times.

These general considerations lead to the conclusion that with the restoration of communication and transportation the demand for iron and steel will considerably exceed that of the years preceding the war.

Now, let us look to the extent this demand can be met by Russian iron and steel industries. First, let us consider the deposits of iron ore. In this respect the situation is more than satisfactory. The general reserve of iron ore in Russia, not including Poland, has been estimated by the Russian Geological Survey in 1910 at 2,200,000,000 tons, which corresponds to 900,000,000 tons of pig iron (the maximum yearly output of iron ore in Russia does not exceed 9,000,000 tons). These figures of the iron ore reserve are much too low, as they include only the iron ore reserves in certain deposits which have been explored and estimated. For the immense expanse of Siberia, which has been very little explored for ores, the deposits have been estimated at only 27,000,000 tons. This, certainly does not represent the actual deposits of Siberia. The extent to which this circumstance influences the calculated amount is indicated by the fact that the explorations made in 1912-1914 of the iron ore deposits in the Ural Mountains have raised the figure of the iron ore reserves for Ural, calculated in 1910, from 282,000,000 tons to almost 400,000,000 tons, or more than 40 per cent.

Also the figures for the general reserve of iron ore have not included the poorer ores, containing less than 40 per cent of iron. However, with time the exhaustion of the world's iron deposits will, doubtless, lead to new developments which will permit of the profitable smelting of such ores. This latter consideration in figuring for centuries must certainly be given attention, particularly when we consider that in the Central and Northern Russian provinces of Riasan, Kaluga, Nijni-Novgorod, Vladimir, Orel, Tula, Vologda, Viatka and Olonetz, the low percentage iron ore is widely distributed.

Therefore, the stores of iron ore in Russia are more than sufficient to supply the needs of the domestic mar-

ket, no matter how colossal these may be. Therein lies our advantage over the neighboring European countries, as for instance, Germany and France, who are compelled even now to base their calculations on the exploiting of low grade Lorraine ores.

The presence of coal at or within the reach of the ore deposits will determine the centers of development. Later, when considering the iron regions separately, this question will be dealt with more in detail. It should be noted, however, that with an adequate development of the railroads the stores of fuel are more than sufficient for the development of the iron ore resources of Russia, no matter how intensively this development is carried on.

#### Capacity for Iron and Steel Production

In order to make clear to what extent existing equipment is able to meet the demands of the domestic market for iron and steel, the figures for the production of these plants for 1913 are given below:

	Tons	
	Pig Iron	Iron and Steel
South Russia .....	3,420,000	2,538,000
Ural .....	1,008,000	738,000
Central and North Russia..	216,000	666,000
Total .....	4,644,000	3,942,000

In addition to this tonnage there was imported from abroad 36,000 tons of pig iron and 504,000 tons of wrought iron and steel, rolled and in products.

Of the last item machines, apparatus, parts, etc., totaled 342,000 tons. The total consumption in 1913 was, therefore:

Pig iron .....	4,680,000 tons
Iron and steel .....	4,446,000 tons

In order to show how much the iron output of the plants was below their capacity that year, data on the blast furnaces that were operating, idle and in process of construction, are given below:

	Operating			Under construction
	Operating	Idle	Operating	
South Russia .....	50	11	5	
Ural .....	73	52	1	
Central and North Russia...	17	29	..	
Total .....	140	92	6	

The average output of one blast furnace for the year was, in tons:

South Russia .....	69,822
Ural .....	14,274
Central and North Russia..	13,500

Allowing 10 per cent for furnaces out of blast, due to repairs or for other reasons, we have the capacity of these furnaces when added to those under construction in 1913, giving the following additional tonnage for that year.

	Average per furnace*	Total furnaces	Idle furnaces	Furnaces in operation	Output of pig iron*
South Russia....	69,822	16	7	9	628,398
Ural .....	14,274	53	13	40	570,960
Central and North Russia..	13,500	29	5	24	324,000
Total .....		98	25	73	1,523,358

\*Tons.

Consequently, the existing equipment of the blast furnaces brings the smelting capacity to approximately 6,000,000 tons, which would exceed the maximum of production reached up to this time by almost 30 per cent. To work this tonnage into wrought iron and steel will present no difficulties, because the output of the rolling mills was below their capacity to a considerably greater degree than was that for the blast furnaces.

Taking into consideration the imports from abroad in 1913, it is found that the output of iron for the domestic market can still be increased above the quantity absorbed in 1913 by 791,000 tons, or approximately 18 per cent on the condition that none is imported.

#### Means for Increasing the Output

Of course, the extra 791,000 tons of iron and steel will not meet the acute need which will exist for many years. Therefore, there is the necessity of finding other means for meeting this demand, viz: Importing from abroad, developing existing regions, and opening new regions.

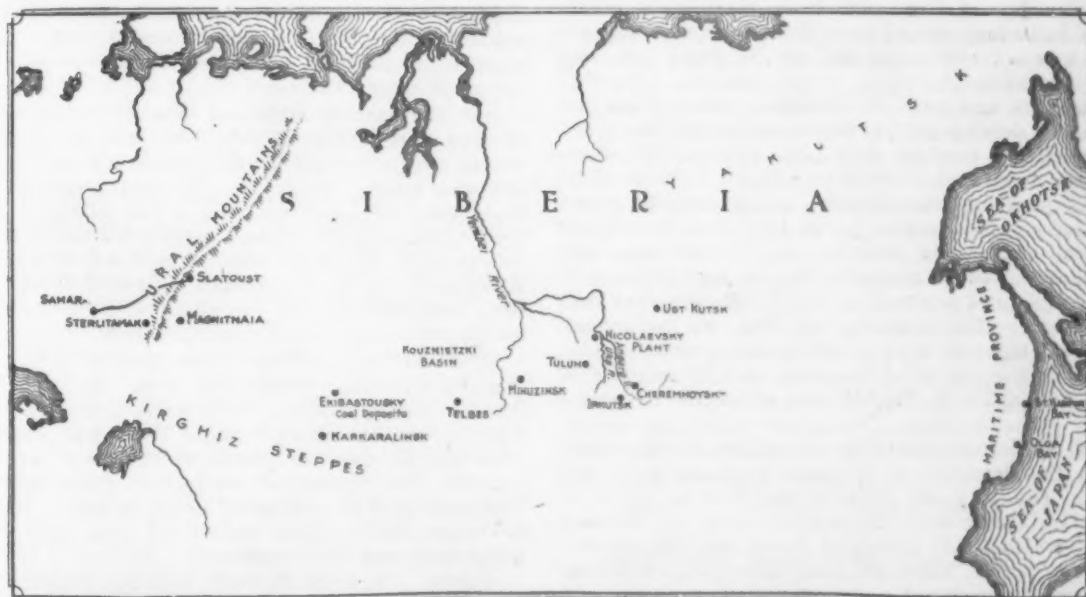


Importing does not appear to be the most desirable from the standpoint of the country's economics in general, and in view of the existing unsettled condition would be accompanied with great difficulties. It will, however, have to be resorted to in the beginning, exclusively for procuring machinery, implements for farming and railroad equipment. The importation of other iron and steel products would be, in view of the present conditions, a luxury which cannot be afforded.

Developing existing regions and opening new regions present the most attractive solution from an economic standpoint, and no effort should be spared in these directions as the period of reconstruction and rehabilitation of the country's industries is now exceedingly favorable. Before the war the development of certain regions was held back by the limited capacity of the market and by the rivalry and the competition of the separate regions who were striving to control the market. Now the situation is totally changed, and the market cannot be saturated for many years. Under such conditions private initiative and enterprise invested in the iron and steel industry will bring rich returns, without any worries about the disposition of the manufactured products. Russian capital, whatever of it that will be salvaged after the Bolshevik calamity is over, as well

this period have dispersed all such doubts. At the present time the reserve of ore unmined in Krivoi Rog is estimated at over 400,000,000 tons, and every year new ore-beds are discovered. As a supplementary supply for southern plants, there is the reserve of about 500,000,000 tons of ores on the peninsula Kertch. These deposits, though poorer in iron, about 40 per cent, are in thicker and larger strata, which would allow of power excavation. These ores could be melted mixed with those of Krivoi Rog.

Regarding the deposits of coking coals in the region of Donietz basin, the apprehensions lest they become rapidly exhausted were based, apparently, on the considerations that they have been most intensively mined. The Russian Geological Survey of these regions, however, disperses these fears. Out of the total deposits of the pit coal of this region, which are more than 55,000,000,000 tons, the share of the coals, belonging to groups I-IV of Gruener's scale, including the coking coals, is about 18,000,000,000 tons. If we compare this with the fact that since the discovery of the Donietz coal region the total quantity of these coals mined is estimated at not over 300,000,000 tons, which is less than 2 per cent of the aggregate quantity of the deposits, it is clear that the time to speak of the exhaus-



Deposits of Iron Ore in Siberia Have Been Very Little Explored but Are Estimated at 27,000,000 Tons. Ore deposits at Magnitnaia and other points in South Ural are cut off from the railroads which are necessary to connect them with coal deposits at Elkibastousky and pit coal at Kousnietzki basin. Large iron ore deposits have been found in the Kirghiz steppes, vicinity of the Uka and Angora rivers and in Maritime Province

as foreign capital, will gladly invest, and consequently, the degree and the rapidity of the development of separate regions will be determined mainly by their natural resources and by the growth of transportation facilities.

#### Location of the Iron Regions

Let us consider from this viewpoint two principal iron manufacturing regions, South Russia and Ural. The central and northern regions are not considered because of the impossibility of working on a large scale the local low-percentage ores, the beds of which are so distributed that they permit of working only on a small scale and in a more or less primitive way. These are sources for local markets only.

In South Russia is the largest region of the iron industry in Russia. It furnished in 1913 about 3,420,000 tons of pig iron and 2,538,000 of wrought iron and steel. Regarding the deposits of ores in the region Krivoi Rog, on which the whole southern region is mainly dependent, there was much apprehension 10 years ago because these deposits at that time were estimated at several tens of millions of tons, which with the steadily increasing yearly mining, reaching in 1913 7,000,000 tons, would secure a supply of ore to the southern plants for not more than 10 years. Nevertheless, the southern region since that time has been working 10 years, and the explorations made during

tion of the coke deposits in the Donietz region has not yet arrived.

Of all the iron regions, the South Russian region has the best developed railroads. This fact, coupled with the use of mineral fuel for smelting, enables this region to develop production rapidly. That is the reason production of pig iron from 1910 to 1913 in South Russia increased from 2,268,000 tons to 3,348,000 tons, an average yearly increase of 270,000 tons. This places the South Russian iron producing region in a particularly important position as a source of supply during the first stages of reconstruction.

#### The Riches of the Ural Region

The second place in importance as to the developing of the iron industry belongs to the Ural region, which in 1913 supplied 1,000,000 tons of pig iron and 738,000 tons of wrought iron and steel. With regard to iron ores this region is exceptionally wealthy, having in abundance remarkably pure and easily fusible ores, the deposits being estimated at nearly 400,000,000 tons. The vast stretches in South and North Ural are still unexplored, and the geological data give grounds to the belief that further prospecting and exploration in these parts will lead to a discovery of new deposits.

With regard to fuel, the Ural region is not so favorably situated. The deposits of coking coals which could be utilized in the Ural region have not yet been dis-

covered, and this region is smelting exclusively with wood. This fact, in connection with the remarkable purity of Ural ores, produces pig iron of qualities particularly adapted for manufacturing high grades of steel, with which Swedish pig iron only can compete. The necessity of smelting with wood, however, is a drawback, as this limits production to the forest growth and does not allow of production on a large scale; also the efficiency of charcoal blast furnaces is considerably below that of coke furnaces. The average productivity of the Ural blast furnaces in 1913 was 14,274 tons, while for South Russia it was 69,822 tons, almost five times greater.

Insufficient railroad facilities in Ural also hinders what should be a large development to correspond to the natural mineral wealth of this region. Some plants on the eastern slopes of Central Ural, which are provided with less ores than the others, were compelled to curtail their production, while the richest deposits of magnetite of the mountain Magnitnaia in South Ural estimated at 37,500,000 tons, remained almost untouched as the result of not having rail facilities, and only at the time of the war was a line undertaken to connect with the Samara-Slatoust Railroad. The rich Komarovskiy and Zigazinski deposits, and a number of other deposits in South Ural, also remain cut off from the railroads. A line built from Magnitnaia to the town Sterlitamak would provide all of these deposits with an outlet and would call to life many new iron and steel plants.

Therefore, under the circumstances, Ural is not in a position to develop its production as rapidly as South Russia. If we consider this same 4-yr. period of exceedingly favorable market conditions, 1910 to 1913, we see that while South Russia had increased its yearly output of pig iron in that period by 1,080,000 tons, for Ural the increase in 1913 as against 1910 was only 306,000 tons, but as against 1900 the year of the preceding maximum production of 900,000 tons, was only 108,000 tons. Consequently, all that we can expect from Ural to start with would be the renewal of the activity of the idle blast furnaces, and an increase of output of 500,000 to 600,000 tons above the output of 1913.

Such an increase would be altogether out of proportion to the demands which could be made upon this region. The way out of this situation would be to smelt Ural ores with the coking coals of Western Siberia, which would permit of developing the industry on a large scale. When the South Siberian line is completed and is developed eastward until it connects with the Kolchougin branch it will undoubtedly be the turning point in the history of the Ural iron industry. Then the iron ore deposits of South Ural will be connected with the Ekibastousky coal deposits and with the Kouznietzki pit coal basin which contains the coking coals; and the coal deposits in Kouznietzki basin alone are no smaller than those in Donietz basin, and probably are considerably greater.

The proper development of the railroads of the Ural, as well as of the lines connecting this region with the West Siberian coal deposits, will enable Ural to show the same proportion of growth in production as has been observed in South Russia.

#### The Regions of Siberia and Caucasus

An appearance of new regions of iron industry must be expected in the remote districts of Russia, in Siberia and in Caucasus. Immediately preceding the war there was no iron industry in these districts at all. In 1875 the only iron manufacturing plant in Caucasus, the Chatahsky iron plant, ceased to exist, and in 1911 the last of the Siberian plants, the Abakansky, had been shut down. After the war started the Petrovsky plant, in Nerchinsky district, resumed activity on a small scale. Such a situation is due to the small capacity of the Siberian market and to the impossibility for these small Siberian plants, without railroad connections, to compete with the firmly established regions of European Russia. The radical change in the situation, as has been explained, has already set in.

The Caucasus is poorer in iron ores than in copper, zinc, lead and silver ores. But it is noteworthy that

with regard to iron this region has been very little explored, although within the boundaries of the provinces of Elizabetpol and of Kuban are found indications of iron ores. Definite data have been obtained at the present time only regarding two deposits. One near Tiflis contains 1,000,000 tons of 60 per cent hematite; and the other, about 20 miles from Elizabetpol, a deposit of 60 per cent magnetite, estimated at 13,000,000 tons. So considerable a deposit can serve as a basis for a sizable plant.

The coking coals in Caucasus up to this time have not been mined. However, they are found in a deposit estimated at over 200,000,000 tons near the Black Sea coast and about 25 miles from a railroad. A short railroad branch would solve the problem of supplying coke for smelting the Caucasian ores.

In Siberia several future centers of iron industry are indicated, provided with both ore and coking coal, the latter coming from the West Siberian coal deposits, particularly the Kouznietzki basin. At the southeastern border of this basin are deposits of 68 per cent magnetite, estimated at 25,000,000 tons, which alone would be sufficient for large plants.

Within the boundaries of the Kirghiz steppes north and south of Karkaralinsk, there are hematite and magnetite ores containing 60 to 63 per cent iron. The deposits are in the shape of thick ore bodies and seams which indicate that the size is considerable. Coke for smelting these ores can be obtained from Ekibastousky or Kouznietzki.

On the eastern slopes of Kouznietzki Alatau and further east in the Minuzinsk steppe and to the east of the river Yenisei, there stretches a series of ore deposits, mostly magnetite. The best explored among these are: Abakanskoye with about 3,000,000 tons of 70 per cent magnetite, and Irbinskoye with about 8,000,000 tons of the same ore. A railroad, if built from Kouznietzki to Minuzinsk and extended to the northeast, would pass across the whole of these deposits and would make available Kouznietzki coke.

In Irkutskaya province deposits of 58 to 65 per cent magnetite stretch northward from the line of the Siberian Railroad along the river Angara and its tributary Uka. On these deposits there was founded in 1846 the Nicolaevsky plant, which ceased to operate in 1899. The amount of ore in four deposits that had been worked was estimated, as given above, at 3,000,000 tons. In the same region are also other deposits which have not been explored.

Should a railroad be built between Tulun and Ust Kutsik, it would pass through this district and would make it possible to smelt the ores of the Nicolaevsky district on Kouznietzki coke. Moreover, the position of the deposits along the river Angara admits a transportation of the ore down this river which approaches the Siberian Railroad near the Cheremhovsky coal district. Some coals of this district furnish the necessary coke. The cheapness of transportation by water and the proximity of the city Irkutsk indicate that the smelting of the Nicolaevsky ores will be concentrated in this district.

On the Far East Coast a large center of the industry is indicated in Maritime Province, near Olga Bay and St. Vladimir Bay, where a number of deposits of 60 per cent magnetite are known. The amount of ore in three of them, Bielogorsky, Vladimirsky and Mramorny Mys (Marble Cape) is estimated at about 6,000,000 tons.

Therefore, though the Siberian iron-ore deposits are so far but little explored, still it is possible to indicate a number of regions where the appearance of an iron industry is likely in the not distant future. The whole northern part of Siberia is totally unexplored with regard to ores. Nevertheless, in some localities the presence of ore is an unquestionable fact, as for instance, in Yakutsk province where an iron industry exists in a primitive form among the Yakouts, who are smelting iron in wind-furnaces.

The conclusions to be drawn from these facts are summarized in the following statements:

1.—With the re-establishment of the normal economic life in the country there will be at once created



a demand for iron and steel products, a demand considerably exceeding the consumption before the war.

2.—The natural resources of Russia consisting in the deposits of iron ores and of pit coal admit of a development that will meet the need, no matter how great.

3.—The present equipment of iron and steel plants permits of an increase in production of not more than 18 per cent of the consumption in 1913.

4.—A demand in excess of that of 1913, in the first stage of reconstruction, can be satisfied only at the

expense of the development of the South Russian plants and by imports from abroad.

5.—The development of the production of pig iron on a large scale in the Ural region is quite feasible after completing the South Siberian Railroad and building some other railroads connecting Ural with coal deposits in western Siberia.

6.—At the present time the following centers of iron industry in Siberia are indicated: Karkaralinsk district, Telbes, Minusinsk district, Nicolaevsky district of Irkutsk Province, district in Maritime Province.

## British Blast-Furnace Slag in Concrete

Strength Slag Aggregate—Experience in England—British and American Slags Compared

THE use of crushed and screened blast-furnace slag in concrete is well known in this country and is attracting attention abroad. There are large slag dumps in the Middlesbrough district in England, and much slag is produced there every day. Dr. J. E. Stead, the well known English metallurgist, recently read a paper before the Cleveland Institution of Engineers entitled "Blast-Furnace Slag in Concrete and Reinforced Concrete." The concrete foundations of very many large buildings and of machinery in that district have crushed blast-furnace slag as the aggregate, and wherever it has been necessary to remove such foundations no deterioration or disintegration has been found.

### British Examples of Slag Concrete

The great breakwater at the mouth of the River Tees at South Gare is in part constructed of slag concrete and stands as a monument to the value of slag as the aggregate in concrete. Huge slag concrete blocks have to be periodically placed round about the end of the pier to break the force of the waves. These are rolled about and in time get ground down by sheer attrition. Specimens from these blocks varying from 6 to 17 years in use show no evidence of disintegration. The particles of slag aggregate are as sound as the binding matrix.

Another sea pier is the one at the plant of the Skinningrove Iron Co. finished in 1891, which was constructed of a concrete consisting of fine granulated slag and 25 per cent slaked lime, sand from the beach and crushed slag as the aggregate. Samples broken off below high water mark show the concrete to be in good condition. One piece contains a lump of slag firmly cemented to the matrix, the corners of which are quite sharp. The concrete is almost as good after 30 years' exposure as that taken from the large blocks after weathering 17 years.

Crombie & Son of Middlesbrough has had more experience in the use of slag than any other firm in the district. Their annual average amount of crushed slag used in concrete for the 10 years up to 1914 has been about 10,000 tons. Quite recently they made 50 miles of reinforced covers for electric cable channels, with crushed slag as the aggregate. Since the war reinforced concrete pit props have been made by them, also many of the buildings at the new coke ovens at the Redcar Iron Works are constructed of slag aggregate reinforced concrete. In addition they have supplied all sorts of reinforced slag concrete window sills, ornamental house facings, stairs and landings, etc. Other concrete contractors have also used the same material in considerable quantities and it may be accepted that in the Middlesbrough district the use of reinforced slag concrete for almost every purpose is firmly established.

In the discussion of the paper Mr. Crombie stated that in 40 years' experience he had never found deterioration of steel in concrete. The best slag concrete he makes had been obtained from Cleveland ironstone slag and Portland cement containing only about 30 per cent lime. He specializes in floors and erection work where it is essential to have a hard aggregate and the best aggregate is clean slag free from dirt and scale, and

by preference slag run into ladles and allowed to cool before tipping. Tests have shown slag concrete to stand nearly 40 per cent more strain than whinstone concrete.

### British and American Slags Compared

Dr. Stead reviewed the recent literature on the subject paying great attention to the papers and reports published in the United States. The analyses of the Cleveland hematite slags approximate very closely in composition those produced in our furnaces smelting Lake ores. The slags obtained from smelting Cleveland ironstone, owing to their high content of alumina and magnesia and low proportion of lime, have never been known to disintegrate on exposure to air and rain, and for that reason are at all times (whether weathered or not) perfectly suitable for concrete making. It is safe to use the slag as soon as it cools. Slag balls which have been exposed to the weather for 50 years show no signs of disintegration. The hematite slags do not disintegrate except when the lime is increased to 50 per cent, but at that point they spontaneously desintegrate soon after they become cold. This is a phenomenon not due to weathering or the absorption of water or carbonic acid from the air, but to a remarkable physical

### Effect of Exposing Powdered Slag to Water

	Combined water, Per Cent
Outside layers, ¼-in. pieces old slag.....	0.60
Inside portions, same pieces.....	0.20
Outside layers of small pieces slag aggregate from concrete, South Gare Breakwater, exposed at least 30 years.....	1.20
New slag in fine powder after being kept moist 14 days.....	0.35
Slag sand made by running liquid slag into water.....	0.20
The same slag sand after being moistened with water 14 days.....	0.55
The same slag chilled on an iron plate, powdered and moistened for 14 days.....	0.32
Slag brick concrete, Wood-Bodner process, after weathering 6 mo.....	9.50
The same after exposure in a wall for at least 30 years.....	12.55
Limestone, whinstone and granite in powder after keeping moist for 14 days.....	NH

change of some of the slag constituents. The molecules become rearranged and the mass simply falls to powder. It is this tendency of such slags to disintegrate which has led civil engineers to prescribe for concrete construction well-weathered material.

It may be taken as proved that hematite slags which have been weathered for six months or more and have not fallen to powder are quite suitable for concrete construction.

### Greater Strength of Slag Aggregate

A very interesting section of the paper is devoted to the question why blast-furnace slag aggregate makes stronger concrete than other aggregates. This has been found to be true here as the result of careful research. Dr. Stead's explanation is that all crushed blast-furnace slags, excepting perhaps the siliceous slags from charcoal furnaces, on being exposed to moisture or liquid water become more or less hydrated on the surface. That such is the case has been proved by care-

ful examination of the aggregates of slag separated from very old concrete, and from slags removed from situations where they have been constantly damp for years. It is also proved by exposing finely powdered slag to water for even 14 days, for they chemically fix water in that short time. Some examples of this are given in the accompanying table.

There can be little doubt that finely powdered slags would, in moist situations, chemically combine with a considerable quantity of water. The more lime present the more readily does hydration occur, for calcareous slag in powder behaves almost like Portland cement and soon becomes hydrated when it is mixed with water. Lumps of cement clinker behave much like slag. The surfaces become hydrated and if used as an aggregate in concrete with finely powdered Portland cement would make a very strong coherent mass, for the hydrated surface layers of the aggregate would crystallize together with the fine cement covering them. As the

pieces of slag become superficially hydrated in concrete the surrounding cement will equally crystallize with the hydrated surface layers and produce a strong junction.

The weight required to crush pebbles and whinstone is greater than for average blast-furnace slag, and as the surfaces of the natural rocks and pebbles do not readily become hydrated the union between their surfaces and the surrounding cement when together in concrete is not as great as it is with slag and cement. Therefore, the slag concrete is the stronger.

In Dr. Stead's experience the difference between the strength of the joints between cement and slag on the one hand and cement and pebbles on the other, in broken ancient concrete which had been made with a mixture of slag and pebbles as aggregate, is that the fractures pass round the smooth surfaces of the pebbles but always through the slag and never at the joints.

G. B. W.

## British Institute of Metals Meets

Season Cracking of Brass, Bearing Metals,  
Solidification and Molding Sands Are Discussed

**A**T a meeting of the British Institute of Metals at Sheffield, Sept. 24 and 25, a number of interesting papers on non-ferrous subjects were presented. Season cracking of brass was the subject of a paper prepared by W. H. Hatfield and Captain G. L. Thirkell.

An example of season cracking in the form of a brass plant bowl having come to the authors' notice, a chemical and metallographical investigation was made. As further information was necessary, a series of cups were spun from sheet brass under like conditions. Rings were cut at regular intervals down the cup and after being carefully measured were severed, and the change in diameter over the original dimensions provided data for calculating the stresses inherent in the metal as a result of the cold work. Different cups were annealed at varying temperatures to determine the effect of such annealing upon the removal of the stresses which had been proved to exist in the spun condition. Cups in the spun and in the variably annealed condition were placed in mercurous nitrate and by the corrosive action of that reagent the liability to crack was determined.

### Reasons for Season Cracking of Brass

These investigations led the authors to the conclusion that spun brass articles may contain internal stresses approximating to the maximum stress of the material. The examination of the original specimen indicated that corrosion had an important bearing upon the formation of the cracks and it was therefore considered that the experiments established that the cause of the cracking lay in local weakness resulting from the discontinuity of surface produced by corrosion inducing a local concentration of the stresses already existent in a spun article. It was established that the objectionable internal stresses may be successfully removed by annealing; with progressively increasing annealing temperatures the internal stresses being gradually reduced to zero. The authors concluded that it was not reasonable to look for an explanation for failure in the postulated properties of an amorphous film existing between the crystals.

In a discussion of the paper, Dr. Walter Rosenhain criticised the author's method of estimating stresses by the expansion of rings cut from a spun cup. Such a ring, he said, was deprived of the support of its neighbors, and the results were therefore unreliable; also the mere question of stress was not sufficient to account for season cracking. He exhibited a number of specimens in support of this contention, one of the most striking being a sample of cast lead on which no cold work whatever had been done, but which nevertheless showed intercrystalline cracks. All these questions of season cracking, Dr. Rosenhain said, were really a matter of the position of the metal in the temperature scale, and

probably the metal tungsten would act in the same way if the world were at a temperature of about 1500 deg. C.

Dr. F. C. Thompson was of the opinion that there were many causes of season cracking in which corrosion could not be a factor of any importance. Between the time of spinning and the time of season cracking, he said, some change must have occurred which converted the material from a typical ductile to a typical brittle metal by the lapse of time and at low temperatures.

Replying to Dr. Thompson's views on the influence of time, Dr. Hatfield stated that he thought the way the stress was applied and not the lapse of time had great effect in deciding whether the cracks went through or between the crystals.

Captain G. L. Thirkell, replying to Dr. Rosenhain's criticism of the method of calculating stresses, said that the possible error due to the variation in the thickness of the pot was about 5 per cent as a maximum, which would have no material effect on the conclusions.

### Composition and Pouring of Bearing Metals

A paper on observations on a typical bearing metal, written by Miss H. E. Fry in collaboration with Dr. W. Rosenhain, was presented. The paper embodied the results of an investigation into the effects of pouring conditions on the microstructure and hardness of a white bearing metal of the composition copper 4.4 per cent, tin 86.6 per cent and antimony 8.8 per cent. The results showed that the method of casting such an alloy influenced the microstructure to a marked degree, and that by varying the temperature of pouring and the type of mold great variations in grain size could be produced.

Admiral Sir George Goodwin said that there was a great difference of opinion among engineers as to the desirable amount of couper; some put it as low as 2 per cent, others as high as 7 per cent, but many contractors for the navy solved the difficulty by adding 2 to 7 and dividing by two. He thought failures must be due to the breakdown of the oil film between the running and standing part of the bearing. In Mitchell thrust bearings, he said, they designed for a disk pressure of 200 lb. per sq. in., but in practice they often worked satisfactorily up to 500 or 700 lb. per sq. in. He therefore thought that such failures as occurred must be due to wrong treatment of the metal rather than to the pressure.

Dr. Rosenhain, referring to the question of the oil film, said that the reaction on the metal was by no means the only thing to be considered. Owing to the high viscosity of the oil, the tangential pull was very appreciable and tended to drag a surface film of the metal with it, thus wearing away the softer parts. The hard parts then penetrated the oil film and the bearing broke down.



Prof. Cecil H. Desch then introduced the second Beilby report on the solidification of metals from the liquid state. This report, he stated, was to be regarded as an interim one. It dealt with two questions which have arisen in the course of the main investigation, namely, the form of crystal grains and the condition of cellular convection.

#### Investigating of Molding Sands

A paper on molding sands for non-ferrous foundry work was presented by P. G. H. Boswell, professor of geology in the University of Liverpool. He pointed out that although the difficulties arising from the use of unsuitable molding sands in the casting of non-ferrous metals and alloys are not so acute as those similarly concerned with steel, the former carries with it problems peculiarly its own. Prof. Boswell urged the investigation of molding sands in works' laboratories and indicated methods of testing and standardizing such sands. He emphasized the use and significance of chemical, mechanical and mineral analyses and stated that it was found that in sands used for non-ferrous work the mechanical analysis rises to the position of

prime importance. Methods for the graphical representation of the results of analyses were presented.

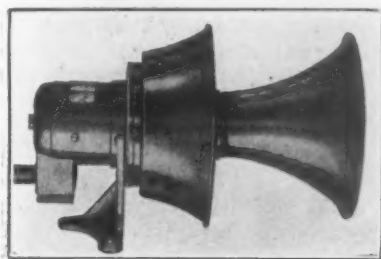
The bond of molding sands, Prof. Boswell stated, may be natural or artificial, or at times both. The natural bond is either hydrated iron oxide or clay and in order that the bonding power should be a maximum the clay or other material should be evenly distributed round the quartz grains. Hence the importance of the proper mixing and milling of molding sands.

The location of British resources of suitable sands in relation to the areas engaged in non-ferrous foundry work was discussed. The nearest and most suitable supplies to each metallurgical district were indicated, the distribution being shown upon a map.

The business discussions of the meeting were preceded each morning by a cinematograph exhibition arranged by Verdon O. Cutts, showing electric furnaces in operation in the United States. This exhibition was of considerable technical interest, especially in view of the fact that the electric furnace in England has not hitherto been applied except in a very tentative and experimental manner for the melting of non-ferrous metals and alloys.

#### Weather-Proof Siren for Emergency Signal

A siren with a weather-proof housing for use as an



Siren for Emergency Signals

emergency signal for factories, steel mills, coal mines, etc., is announced by the Inter-State Machine Products Co., Inc., Rochester, N. Y. The siren may be used either in a vertical or horizontal position. The actuating motor operates on 110 volts direct current or alternating current of any frequency. Motors for different voltages can be supplied. The finish is of bright red enamel, baked on. The siren is said to be impervious to rain or snow, as all parts are made from copper and aluminum. When intended for inside use, the weather-proof housing is not furnished. A double-head siren intended as a community alarm is also manufactured.

#### New Indicator Cord Hook

An indicator cord hook which is explained as enabling the engineer to as easily and quickly connect the indicator cord with the cross head of a high speed engine as with a low speed engine, is being marketed by the Trill Indicator Co., Corry, Pa. The accompanying illustration shows how the hook is attached while the



Hook Designed for Quickly Connecting the Indicator Cord with the Cross-Head of a High-Speed Engine

engine is running. The loop of the hook is held between the thumb and the finger in such a position as to allow the pin on the standard to strike the straight part of the hook when the standard is within about 1 in. of the end of its travel. The hook swings about the thumb and finger as a pivot, which action shoves the hook downward. At that instant the piston has reached the end of its stroke. On the return stroke the pin engages the hook and the attachment is complete.

#### A General Utility Heavy-Duty Shop Truck

A shop truck for general use has been placed on the market by the Wm. H. Haskell Mfg. Co., Pawtucket, R. I. Durability and ease of operation are secured by a ball bearing for the front or steering wheel by means of a reinforced casting bearing containing hardened steel balls which enable the workman to steer the truck without effort and make for solid construction. The body is 21 in. wide, 31 in. long and 13 in. deep, and is supported on two 20-in. 2½-in.-face sidewheels and a 7-in. diameter 2½-in.-face front wheel. The clearances



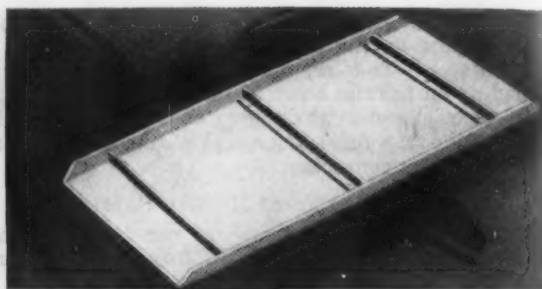
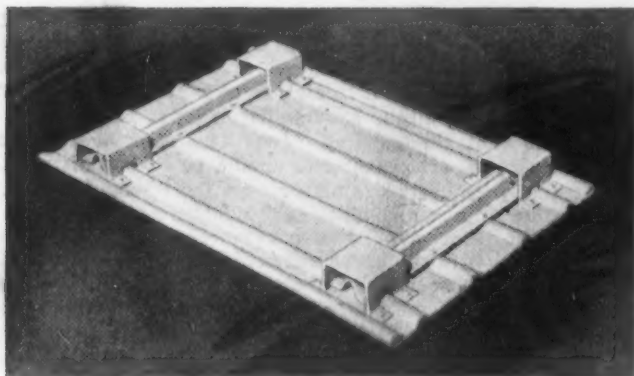
A Reinforced Casting Bearing Containing Steel Balls on the Front Wheel of This Truck Is Emphasized as Making for Durability and Ease of Steering

are 26 in. from floor to top, 44 in. from tip to tip and 26 in. hub width. The sides are constructed of ¼-in. stock riveted at the corners with angle iron. The wheels are of cast iron with ½-in. spokes of round machinery steel, cast in hub and rim in molding. The truck has a net weight of 300 lb. and a cubic content of 3¾ ft.

#### Steel Rails from Various Types of Ingots

WASHINGTON, Dec. 16.—The Bureau of Standards has practically completed its investigation into several types of ingot practice including chemical, physical and metallographic surface of the ingots, and of blooms and rails made from them. Of particular interest is the comparison of properties and segregations of rails made from the ingots of the ordinary shape, following three practices common in the United States, and the corresponding properties of rails made from ingots of the Hadfield type with sink head. This investigation which will be published soon will include chemical analysis of split ingots, split rails and blooms, sulphur prints, metallographic investigations, tensile strength, hardness, and drop tests.

Members of the patternmakers' union, who remained at work at the Brightwood, Mass., plant of the National Equipment Co. during labor troubles, have been thrown out of the Central Labor Union. The expelled organization has the right to appeal its case to the American Federation and ask a review of the facts.



Reinforced Pressed-Steel Board and a Core Plate Made of Rust Resisting Copper-Bearing Steel. The bottom board has lengthwise stiffeners which act as gas vents or chimneys

### Pressed Steel Flasks, Core Plates and Bottom Boards

A line of pressed steel foundry equipment, including flasks, core plates and bottom boards, has recently been placed on the market by the United Metal Mfg. Co., Canton, Ohio. These are made of copper bearing steel, having rust-resisting and non-corrosive qualities. The flasks are pressed from 7 gage or a 3/16-in. plate, and are strengthened with corrugations or flutes 3/4 in. deep and 2 1/2 to 4 in. apart, depending on the size. It is stated that these corrugations are not of sufficient depth to interfere with the shaking out of the sand. Additional strength is secured by providing a flange at the top and bottom of the flask, the top flange turning outward and that at the bottom turning inward, and acting as a support for sand when the flask is raised. The flask is formed in two sections, which are welded together. If the mold requires a three-part flask, a cheek provided with the proper fittings may be used. The surfaces are ground on a surface grinder, this being the only machine operation required.

The flask is provided with malleable iron or pressed steel fittings, handles, pin lugs, trunnions, etc., the fit-

ing to size. All sizes are made either plain or perforated.

The bottom boards have corrugations which not only add to strength, but provide vents for the escape of gasses. The lengthwise edges are turned under to provide additional strength and a clamping edge 1/2 in. in thickness. This edge tapers inwardly so that clamps will draw together rather than snap off. Each board is provided on the under side with V-shaped cross reinforcements and four steel feet to allow it to stand in the floor sand without rocking and to provide ample clamping and lifting clearance between board and floor.

Advantages claimed for the steel bottom boards are that they will not burn or deteriorate as quickly as wood, are lighter in weight and easier handled than cast iron, and there is no danger of breakage due to rough handling.

### Powdered Coal Fuel in Puddling Furnaces

A saving in fuel consumption in puddling furnaces amounting to about 30 per cent is reported as a result of tests at the Shelton Iron, Steel & Coal Co., Ltd., Stoke-on-Trent, England, described by W. Simons before the Iron and Steel Institute convention at London in September. The coal was crushed in a mill usually used for cement manufacture. Owing to the necessity of transporting the powdered coal some distance by rail, from 1 1/2 to 2 1/2 per cent moisture was absorbed, a factor that, it is stated, ordinarily could be limited to 1 per cent.

No difficulty was experienced in getting the requisite temperature, the time for heating the furnace from a cold condition being 1 1/2 hr., as compared with 3 to 4 hr. usually required. With the greater range of regulation provided in a complete plant and with other feasible economies, still further reductions in fuel consumption, it was pointed out, could undoubtedly be effected. As regards waste heat, a meter was fixed to the feed-water pipe of the boiler and the evaporation of the boiler was reduced by 10 per cent for a 30 per cent reduction in fuel; but with the increased output obtainable by using powdered fuel no reason was seen for any reduction in the total evaporation of the boiler previously obtained.

There is no doubt in the minds of the experimenters that greater output than by the usual fuel can be obtained with powdered fuel, owing to its complete combustion. The under hand is relieved of the work of firing and is set free to assist the first hand. Heats were worked in 1 1/2 hr., and in one case 1 hr. 20 min., moreover the furnace under test was held back somewhat by having to take its turn with other coal-fired furnaces.

On the basis of 30 per cent fuel economy, and taking the cost of a plant for about 10 puddling furnaces and firing two Lancashire boilers, adjacent to the forge, as being £22,000, and allowing 2s. 9d. per ton on fuel for grinding, but without allowing for interest and depreciation, there was found to be a net saving per year of 23 per cent on capital invested.

The Machinery Club of Chicago has acquired additional space adjoining its present quarters and eventually hopes to secure the entire floor on which it is located. The present acquisition will increase the club's floor space by one-half.



Pressed-Steel Flask Made from Keystone Copper-Bearing Sheets

tings being riveted to the flask. Among the advantages claimed for the flasks is their strength in proportion to their weight and the limited amount of machine work required. It is pointed out that owing to their lightness the flasks can be stacked up at a considerable height on a foundry floor or a height that would not be practicable to stack iron flasks because of their heavier weight. The flasks are made in all sizes and heights.

The core plates are made of stretcher leveled sheets to provide a smooth level surface and to insure against warping, and in various types of construction, depending on the sizes. The very small sizes are plain flat plates. Larger sizes have edges flanged lengthwise, to give the plates strength and to insure against warping and twisting. The flanged plates are made either without reinforcement, except the flanged edges, or are further reinforced with two or three cross angles or with two cross angles and one diagonal angle accord-



## LIFTS OPERATED BY ONE MAN

### Group of Cars Controlled by Central Dispatcher —Automatic Leveling a Feature.

A new automatic elevator known as the micro-leveling elevator was recently developed by the Otis Elevator Co., New York. It is operated by push button control which stops the car automatically at the desired floor. When the position of the car changes during the loading and unloading, due to the lengthening or shortening of the cables, the car is automatically restored to the landing level.

Groups of these elevators operated by central dispatchers are installed at the United States Army Sup-



The Central Dispatcher Operates from Seven to Ten Cars by Means of One Upright and One Horizontal Panel. Colored lights indicate the location of the cars and whether the doors are open or closed.

ply Base, Brooklyn, N. Y. There are 90 freight elevators, each of 10,000 lb. capacity; 18 of these serve two floors and have a speed of 100 ft. per min.; 72 serve nine floors and have a speed of 150 ft. per min. The elevator platform is 9 ft. 4 in. x 17 ft. and is intended to carry four trailer trucks. The landing or hoistway doors are opened automatically when the elevator reaches the floor to which it has been dispatched.

From seven to 10 cars make a group which serves a section, or some 325 ft. in length, of each building unit. Each group is handled entirely by a central dispatcher who is located in a small office placed for convenience a short distance from the group. Before him

is a table, not unlike a telephone switchboard with one upright and one horizontal panel. In the upright panel is a column of white lights for each elevator, each light representing a floor. At the top of each column is a colored light which indicates, when lighted, that all hatchway doors are closed and the elevator can be operated. The operating buttons are placed in rows in the horizontal panel.

Such a group system in which the elevators are operated by a central dispatcher, instead of each elevator being placed separately and operated individually, is pointed out as giving the least waiting time and maximum service out of a given number of elevators.

Any elevator can be detached from its group by the central dispatcher. It then can be operated directly from the car switch provided and still retain its automatic door opening and automatic leveling features. Until disconnected from the central board, however, the car switch remains inoperative.

The hoisting unit consists of the main driving machine and the micro-drive mechanism. At the Brooklyn Army Base the main machine is of the worm gear type and is driven by a two-speed alternating current motor giving full and one-third speed. The micro-drive consists of motor, brake and worm gearing of about one-tenth of the speed and power of the main machine. The micro-drive is mechanically connected to the main machine through the revolving electro-mechanical main brake.

The slow motion of the micro-drive through the final few inches of travel in connection with a novel system of control, is explained as resulting in the car stopping level with the landing with any load to the full capacity of 10,000 lb. Since the leveling is accomplished at slow speed and by means of the small motor, it is pointed out that there is less wear and tear of mechanical and electrical parts than with an elevator of the ordinary type and the amount of power required for leveling is reduced to a minimum.

### Objections to Ledebur Method for Oxygen in Steel

A new publication of the Bureau of Standards, Scientific Paper No. 350, "Equilibrium Conditions in the System Carbon, Iron Oxide, etc., in Relation to the Ledebur Method for Oxygen in Steel" shows that mixtures of iron oxide and Acheson graphite are not, and mixtures of iron oxide with "cemented" iron or white iron (annealed or unannealed) are reduced at 900 deg. C. by the carbon in them when hydrogen is passed over them at rates of 2 litres per hour or faster. Because of these facts it is probably impossible to determine by the Ledebur method more than 75 per cent of the oxygen present in steels as ferrous oxide. The effect of rate of passage of hydrogen on the Ledebur oxygen content of certain steels is shown.



These Elevator Platforms Are Designed to Carry Four Trailer Trucks. When the position of the car changes during loading or unloading, the car is automatically restored to the loading level.

## Goodyear Employees Become Stockholders

Over 17,000 employees of the Goodyear Tire & Rubber Co., Akron, Ohio, became stockholders of that company under a recent plan allowing stockholders to subscribe for preferred stock and pay for it in installments. In announcing its partial payment plan the company made the following statement:

"The idea of having stock in the company widely distributed among its employees has its mutual advantages. It is apparent that the good accruing to the company from a holding by a large percentage of the employees of its capital stock comes from the added interest taken in the force of the company and its success by employee stockholders. If it were possible to have every single employee financially interested by the holding of stock, it would be an ideal arrangement, for in the very nature of things it would mean a maximum effort on the part of each towards doing his particular job well, as his part in the successful operation of the company. It would create within the rank and file of the organization an ownership or partnership feeling that would tend to bring out maximum endeavor. This is the plan—its goal is to have as many employees as possible made a real part of the company, an active and appreciative working organization with a substantial interest in its force beyond the mere point of salary drawing."

The inducements offered by the company were very attractive. Under the plan employees of the company or its subsidiaries were permitted to subscribe for up to 20 shares of 7 per cent cumulative preferred stock, payments to be made by making deductions from the pay of each subscriber at the rate of \$4 per share per month and to be completed within two years. Subscribers are to be credited with the regular 7 per cent dividends on the par value of the stock, and are charged 5 per cent per annum on deferred payments.

As an inducement for an employee in good standing to keep his stock after it is fully paid for, the company commencing Nov. 1, 1920, and continuing for a period of five years, will pay a cash premium of \$3 for each share of stock subscribed for under this plan. Employees complying with conditions but not fully paid up will have this amount credited to their subscriptions, thus securing a 10 per cent investment for five years.

Subscriptions will be cancelled upon request of the subscriber upon his voluntarily leaving the company's employ, being discharged for a cause, or failing to resume employment when requested, and by discontinuing payments without the consent of the company for three consecutive months. In case of cancellation the full amount of his payments will be returned to the subscriber with 4 per cent interest. Subscribers whose employment has been suspended by reason of temporary closing of the plant or any portion in which he is employed, and who shall continue ready and willing when requested to resume his employment, will not be deprived of the special allowance of \$3 per share per year during such suspension, although he may have accepted employment elsewhere during that period. The period of suspension will not be counted as part of the two years' limit for the full payment of subscriptions, and during such suspension monthly payments will not be required.

## Decrease in Iron and Steel Wages

WASHINGTON, Dec. 16.—For the first time since the cessation of hostilities, the wage figures compiled by the Bureau of Labor Statistics, show a decrease in iron and steel wages. The latest figures cover September, 1919. In comparison with August, 1919, wages in iron and steel establishments covered by the compilation decreased 2 per cent, while in comparison with the payroll of September, 1918, they decreased 11.2 per cent.

The figures covering the payroll for September, 1919, were \$11,389,023, against \$12,824,070 for September, 1918, and \$11,775,147 in August, 1919. The number of workers was 174,117 in September, 1919; against 199,136 in September, 1918, in 104 establishments. These comparisons for August and September, 1919,

covered only 102 establishments in which there was a fractional increase in the payroll, from 174,604 in August, 1919, to 175,237 in September, 1919.

The statistics are particularly interesting because, for months, the iron and steel industry had the lead in the increases. In previous tables there had been considerable decreases in a considerable portion of other industries. The September table, however, showing 11 out of 13 industries, including iron and steel, and car-building and repairing, reveals an increase in the number of persons on the payroll—the figures for automobile manufacturing being an increase of 40.8 per cent over September, 1918, figures.

## National Safety Council and Safety Institute to Have New York Local Council

The National Safety Council, with headquarters at Chicago, and the Safety Institute of America, New York, have recently entered into an agreement to cooperate in organizing and conducting a local council of the National Safety Council and the Safety Institute with a paid secretary in the Metropolitan District of New York. Headquarters of this local council will be maintained in the office of the Safety Institute and all the exhibits, library, and other facilities of the Institute will be placed at the disposal of the local council.

The New York local council will organize and conduct schools for safety supervisor and foremen, workmen's mass meetings, and conferences for industrial executives. The promotion of public safety, school safety and educational safety will be a distinct service of the Safety Institute, and will be carried on in the Metropolitan District under the direction of the Institute, the National Safety Council co-operating.

The Safety Institute, now located at 18 West Twenty-fourth Street, will soon be moved to the Arsenal Building in Central Park.

## Iron and Steel in the Dutch East Indies

WASHINGTON, Dec. 16.—Trade Commissioner John A. Fowler has prepared a report for the Department of Commerce on the market for iron and steel in the Dutch East Indies. The first requisite of a successful outcome of such a venture is able representation in the field. Before such action is taken, however, he recommends that American steel and iron producing companies inquire carefully into the expenses of such an organization. He declares that unless these companies remain permanently in the market there, withdrawal after a short exploitation would do American business more harm than good.

"There is no question," he reports, "about the amount of business that can be done in iron and steel in the Dutch East Indies. With 200 or more sugar centrals, thousands of miles of light rails are constantly needed, and under the present plans of the Dutch East India Government, 10,000 miles of railroads will eventually be built. Government work planned during the next four years will alone require 45,000 tons of cast-iron piping, to say nothing of the private needs of oil companies for pipe lines, and the demand for reinforcing material on concrete construction work. As soon as conditions become somewhat normal, new mining ventures will be opened up in what is potentially a great mining country, and the supply of machinery for this work will come entirely from abroad."

## German Embargo List

WASHINGTON, Dec. 16.—The Department of Commerce has made public the details of the latest German embargoes on exports. Among the items included in this forbidden list, the penalty for whose exportation without special permit is imprisonment, are the following:

Iron ores, manganese, ferromanganese and ferrosilicates. Iron, pig iron, steel, iron blocks, old iron, iron and steel scrap and foundry products. Railroad rails, field railroad rails, street railroad rails, girders, sheet metals, rolled and turned wire steel and tools. Locomotives and railroad cars for normal gage roads, including component parts and accessories. Anthracite and bituminous coal, briquets and coke.



# Modern Foundry Sand Handling Equipment\*

Numerous Mechanical Devices Increase Production  
—Roughing Screen, Tempering Machine, Belt Conveyors and Individual Sand Hoppers Important Factors

—BY H. L. M'KINNON—

THE present tendency toward quantity production in the foundry has opened the way for more economical methods of handling the sand. The problem is one which rapidly increases in importance as the quantity of sand to be handled increases. This can be well illustrated by considering a foundry with a few men, making castings in a limited quantity, almost wholly by hand. In such a foundry the problem of handling the sand is simple. Enough sand may be placed on the floor in front of each molder so that he can do his full day's work and pour off his castings, and the sand may be returned to him after the day's work is done.

When large production is in process, and many tons of sand are to be turned over daily, the cost of physical labor alone runs up into such large figures that it is essential that mechanical means be found to reduce the expense. The advent of the molding machine into the foundry, and the consequent increase in the productive capacity of the molder has still further added to the

aluminum, the sand should contain a high percentage of clay as a binder, whereas the requirement for steel castings is a sand which is almost pure silica, with the addition of such materials as will give it the proper consistency for the work in hand. As malleable iron requires somewhat higher temperatures than ordinary gray iron, the sand for this work should contain a trifle more silica than is necessary for gray iron castings.

Given the proper sand for any particular class of work, the first operation is the proper screening and treatment of the sand, so as to enable the molder to use it in the production of castings. The manual processes in use for many years consist principally of the addition of water to the sand on the floor of the foundry, either before or after hand screening, and then the cutting over of the sand with a shovel or other tool, and allowing the sand to stand over night so that the water became thoroughly associated with the various particles by capillary attraction.

This method requires considerable floor space for



Gray Iron Foundry with Complete Mechanical Sand-Handling Equipment. Individual overhead sand hoppers are supplied with sand by belt conveyors

burden of handling sand by manual labor and has made it necessary, from an economical standpoint, to provide for mechanical sand handling. Foundries of a continuous character present additional problems which add still further to the difficulties of handling the sand manually.

The use of sand in the foundry divides itself into two main elements; that of making molds and cores. It is further subdivided in accordance with the class of material to be poured in the molds, such as gray iron, brass and aluminum, malleable iron and steel. Each of these divisions is still further subject to minor divisions depending upon whether the work is heavy, or medium, or light.

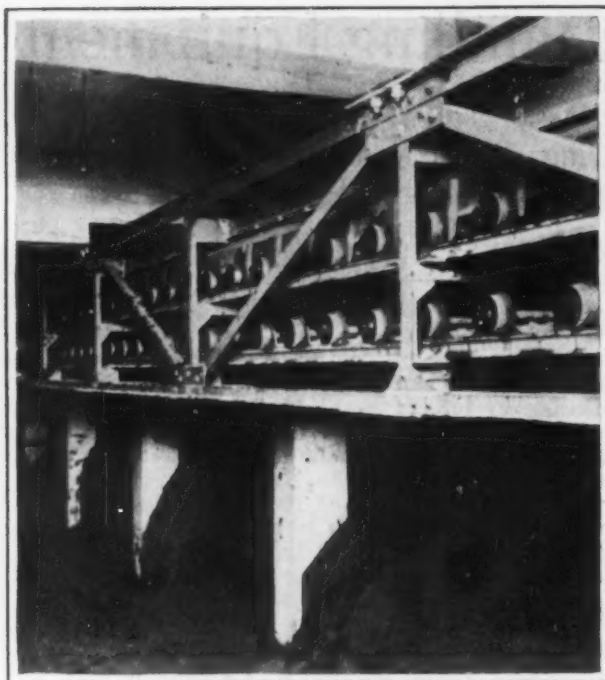
The different qualities which are necessary for the various classes of work are so well understood by foundrymen as to need no explanation here. However, in order to properly understand the problem of foundry sand handling it is necessary to have some idea of the character of the work for which the sand is being used. For light castings of gray iron, brass and

the storage of sand, and usually makes it necessary for the sand to be worked over by a night force after the ~~day's~~ product has been poured. It also involves the shoveling of the sand many times before it is placed in the mold. Such methods cannot be economical in foundries of large production which handle many tons of sand every day.

The mechanical problems to be met depend very largely upon the nature of the work to be done, and whether or not it is desirable to reclaim the core sand as well as the mold sand. Different problems are encountered in handling dry sand molds and in handling green sand molds. The most of these problems are essentially similar in that the sand is of such a nature as to render it practically impossible to divert it from one place to another by chutes. The sand must be picked up and carried from one place to another. It must be thoroughly cleaned. The proper amount of moisture must be added, beaten thoroughly into the sand and then allowed sufficient time for final, even, distribution throughout the mass.

Various mechanical methods are being used for handling sand in foundries. One accompanying illustration shows the interior of a foundry engaged in cast-

\*From a paper presented before the American Foundrymen's Association, Philadelphia, week of Sept. 29. The author is with C. O. Bartlett & Sons Co., Cleveland.

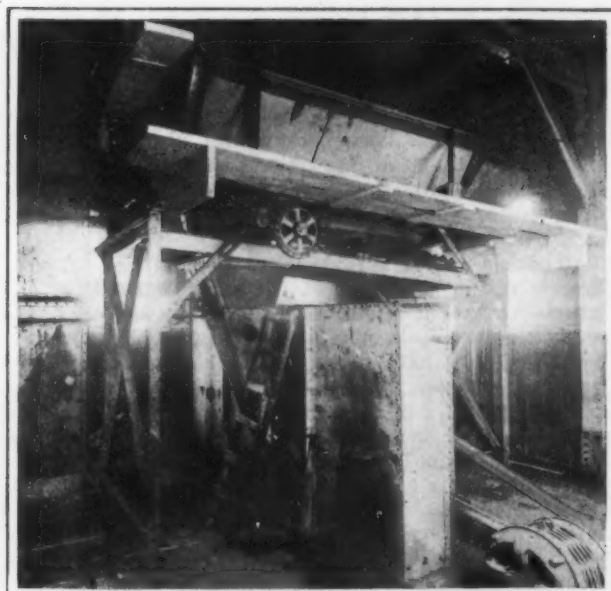


Conveyor Under Foundry Floor for Removing Used Sand

ing light gray-iron parts, practically all of which are being made in snap flasks of such size as to be readily handled by one man. In this particular installation molding machines are operated in pairs, about 6 ft. 6 in. apart, one molder working on a drag and the other on a cope for the same job. As rapidly as molds are made they are laid out in the floor directly back of the molders, where a separate pouring crew attends to the pouring of the metal and the shaking out of the molds.

In order to facilitate the prompt return of the sand in this installation, a pan or apron type conveyor runs underneath the floor of the foundry extending the entire length of the center of the molding bay. Over this conveyor, at intervals, there are receiving hoppers and on top of the hopper there are gratings to prevent castings and matter other than sand from getting onto the conveyor.

The conveyor delivers the sand to what is called the scalping or roughing screen which removes pieces of coke and such small foreign substances which get into the sand. The screened sand then drops into an elevator and is carried to the top of the treating building where it is again screened. After screening, water is added and the water and sand are thoroughly milled in



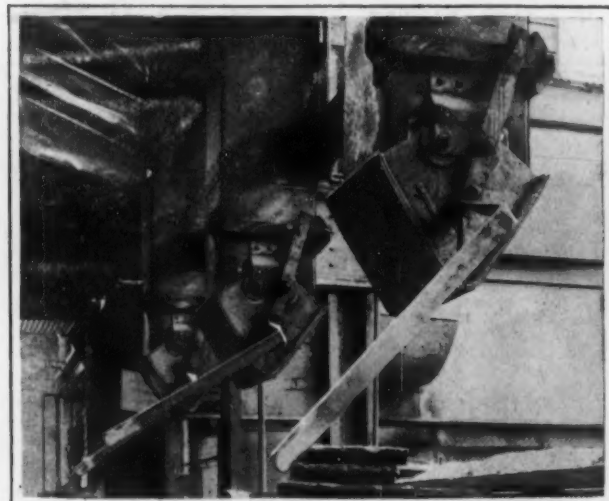
Final Screen and Centrifugal Tempering Machine. Here the water and sand are thoroughly mixed to produce a uniform product

a centrifugal machine which produces a uniform product.

The control of the water supply is in the charge of an operator who is held responsible for adding the proper amount to put the sand in ideal condition. From the milling process the sand drops into a storage bin where it is allowed to rest for a definite period in order that capillary action may take place and the moisture become thoroughly distributed through the particles of sand. From this point the sand is fed upon belt conveyors and distributed to the molders, the hopper for each molder being placed above his machine, so that he can drop the sand directly on the mold if he desires.

This is by no means the only method which can be economically followed in the handling of sand. Frequently it becomes desirable to convey molds for pouring either on a conveyor, or on cars, or by other means, to a central pouring station and from there to a dumping position where the hot sand is disposed of in the same manner as outlined in the foregoing description.

In one large foundry in which there are two screening and treating plants, the equipment is provided with four knockout positions. The molds are brought to the knockout positions after pouring by traveling cranes. The sand is jarred out of the flask by heavy jarring machines, which are essentially similar to the jarring machines used for molding operations. The sand then falls upon the pan conveyor and is carried through the same process of treatment and screening as previously described.



Individual Overhead Sand Hoppers

In the handling of molding sand, a few important general principles should be kept in mind. It is never desirable to handle tempered sand in a bucket elevator if other means can be used. The reason for keeping away from the bucket elevator for this service is that the tempered sand has a tendency to fill up the buckets and requires frequent cleaning in order to maintain the operating capacity. If the sand is handled as it comes from the molds it is generally dry enough so as not to involve this difficulty.

For the distribution of the tempered sand, in my judgment, there is nothing so satisfactory as the flat rubber conveyor belt, even though reciprocating flight conveyors have been used with more or less success. One of the main objections to the reciprocating conveyor is the amount of power required to operate it as compared with the belt conveyor. A further objection is that there is a marked tendency to produce small balls of sand about the size of peas or beans which are detrimental to the obtaining of smooth castings.

The use of the rubber conveyor belt is recommended because it possesses a smooth operating surface which cannot become impregnated with the sand and which resists wear for a long period. The writer recently viewed a belt of this character which had operated through the equivalent of nine years' continuous daily service. The belt is 240 ft., center to center, and handles approximately 250 tons of sand daily. It has been

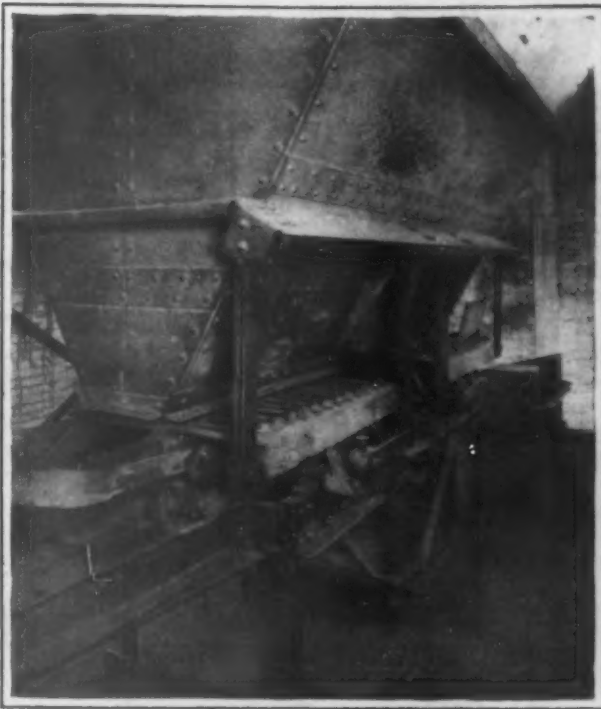


operating for seven years, but during the years 1917 and 1918 worked double shift. At the time it was viewed by the writer it was still in good working condition.

The device for removing the tempered sand from the belt conveyors is simple and consists of nothing more than a curved plate placed so as to act like a plow and turn the sand over at the desired point. These plow plates are hinged at one end so that they may be lifted out of the way, allowing the sand to pass to any other desired point.

One of the principal difficulties which has been met in foundry sand handling has been the problem of properly withdrawing the tempered sand from the storage bin after it has been placed there. Many expedients have been used but it is the writer's opinion that the type of feeder shown in one of the illustrations meets the condition more satisfactorily than any other with which he is familiar. It is easily adjusted and seems to have the peculiar motions which are best adapted for cutting the sand and removing it from the bin in a regular manner.

Another problem presents itself in the handling of core sand, after castings have been poured. The magnetic separator shown in one of the illustrations is placed in the cleaning room of a large gray-iron foundry for the purpose of separating core rods, nails and other magnetic materials from the core sand itself. The first belt shown in the illustration is provided with a magnetic head pulley so that the metal is dropped



Tempered Sand Storage Bin Showing Sand Feeders. This machine feeds the sand upon belt conveyors



Magnetic Separator and Waste Sand Conveyor

on the floor while the sand is delivered upon the belt which runs out of the building. The waste sand can be taken to railroad cars outside, or to a storage bin, or to trucks, or to a storage pile. The magnetic pulley does the work of several men in picking out magnetic materials, and does it cleaner and better.

Mechanical sand handling is entirely practical where the quantity of sand is great enough so that the cost of conveyor equipment, as an overhead expense is not too great. In general it seems to be possible to put in a sand handling equipment on duplicate work where there is a minimum of 150 to 200 tons of sand to be handled daily. In some instances where the work is highly concentrated, a much smaller amount of sand than this can be handled economically.

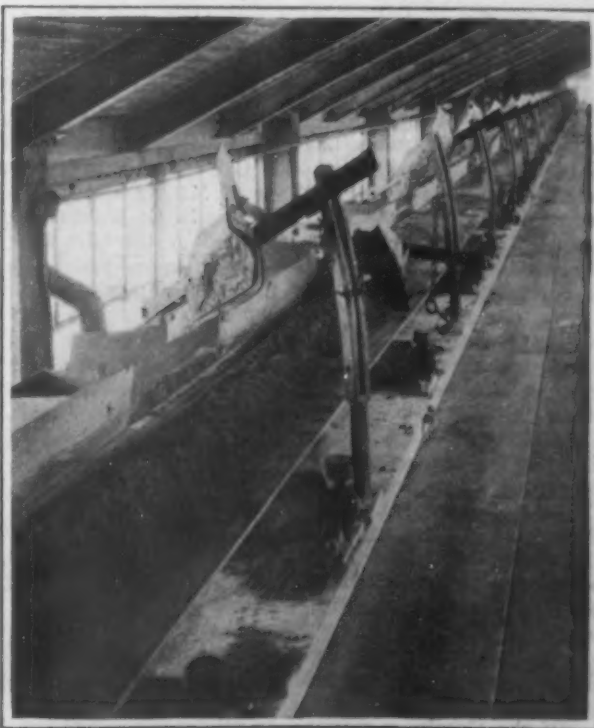
The frequency with which molding sand may be re-used depends primarily upon the dryness of the sand before tempering, that is, if very light castings are being made and the temperature of the sand is not greatly increased, such sand can be used more frequently than that which becomes highly heated.

To my mind the problem of sand handling is simple. The less apparatus that can be used to accomplish a given result is in most cases the most satisfactory. This is due partly to the difficulty of obtaining proper mechanical attention to equipment in most foundries; but without proper mechanical attention there is no equipment that will prove satisfactory and give continuous service. In considering mechanical equipment

it is extremely desirable that the question of mechanical attention be fully considered.

There is no reason why mechanical sand handling equipment cannot be produced to meet any set of conditions, providing there is sufficient sand to handle to justify the initial expense. If properly arranged, mechanical sand handling equipment should result in increased production per square foot per man on any given floor space. This has been demonstrated repeatedly. Ample proof in the form of many successful installations is available for anyone who cares to investigate.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has placed contracts for the erection of a 60 x 187 annex to its machine shop. Work weighing up to 50 tons will be machined in the shop when completed.



Flat Belt Conveyor for Distributing Tempered Sand

### Tote Boxes Designed for Stacking

The tote boxes shown in the accompanying illustrations are being marketed by the E. F. Hauserman Co., Cleveland. The bottom part of the handle is designed to accommodate the flare at the top of the box when the boxes are stacked. The construction of the top of the box, it is explained, is such that the box will not become misshapen and will therefore maintain the stacking feature. The handles are designed so as to be pinch-proof in handling, and no edges of metal are left above the handles to loosen up on the box proper and tear against the flesh through possible careless handling.



Steel Runners Reinforce the Bottoms of These Tote Boxes. The handles are arranged for stacking.

The upper edge of metal on the sides and ends of the box is folded back on the under sides and welded, and the inside of the upper corners are reinforced with electric welded plates of 14-gage steel.

Two 1-in. strap steel runners are welded on the full length of the bottom of the box, thus to prevent sagging and to give it long life. This is emphasized as of particular advantage when loaded boxes are drawn along the floor.

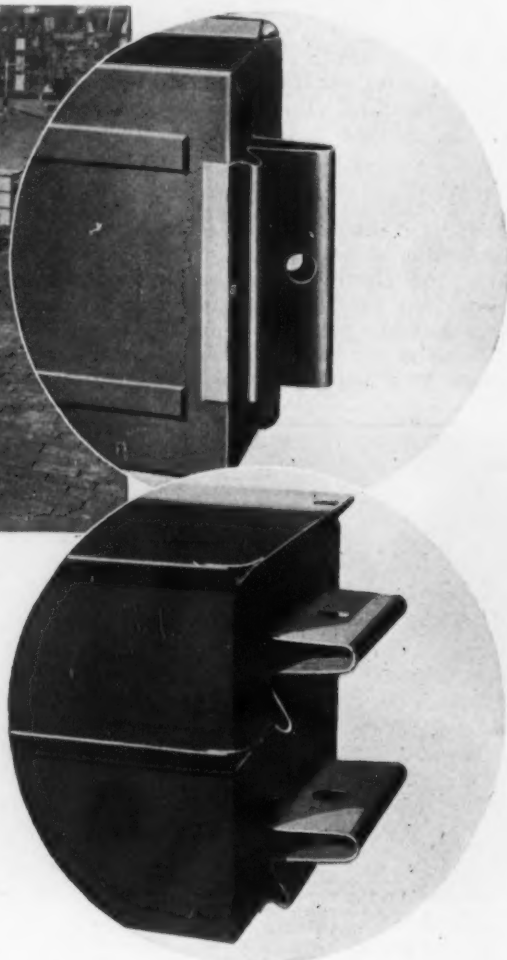
### New Alloys of Aluminum

"Alloy of Aluminum and Magnesium with Copper, with Nickel and with Manganese" is the title of a paper to be presented at the Chicago meeting, this week, of the American Institute of Mining and Metallurgical Engineers by P. D. Merica, R. G. Waltenberg and A. N. Finn. Alloys as indicated by the title were prepared and their mechanical properties and resistance to corrosion determined. Of the aluminum-manganese alloys, one containing 96.86 per cent aluminum, 1.44 per cent magnesium, 0.93 per cent manganese and small amounts of copper, iron and silicon gave the best results in the mechanical tests, namely, tensile strength, 45,000 lb. per sq. in.; scleroscope hardness, 36.5; elongation, 3.5 per cent. Upon annealing at 422 deg. C., the figures were: Tensile strength, 33,100 lb. per sq. in.; hardness, 14; and elongation, 13 per cent. Upon quenching at 500 deg. C., the figures were: Tensile strength, 34,100 lb. per sq. in.; hardness, 15.5, and elongation 10 per cent. An alloy containing 95.08 per cent aluminum, 2.03 per cent magnesium and 1.68 per cent manganese, with small amounts of copper, iron and silicon, while it did not show quite as good mechanical qualities as the alloy described above, nevertheless, gave the best resistance to corrosion from salt water of any alloys of this series.

Of the aluminum-magnesium-copper alloys one containing 95.51 per cent aluminum, 1.26 per cent magnesi-

um and 2.58 per cent copper, with small amounts of iron, manganese and silicon had the best mechanical qualities, having a tensile strength of 56,700 lb. per sq. in.; hardness, 50 and elongation 2 per cent. When annealed at 422 deg. C. the figures were: Tensile strength, 34,900 lb. per sq. in.; hardness, 15.5 and elongation, 20.5 per cent. Quenched from 510 deg. C., the figures were: Tensile strength, 56,700 lb. per sq. in.; hardness, 50 and elongation, 2 per cent. This alloy when quenched showed the best resistance to corrosion of any of this series, although, without heat treatment, its resistance to corrosion was low.

Of the aluminum-magnesium-nickel alloys, one com-



posed of 95.41 per cent aluminum, 2.86 per cent magnesium, 1.08 per cent nickel and small amounts of iron, silicon and manganese had the best mechanical qualities, with a tensile strength of 42,000 lb. per sq. in.; hardness, 32 and elongation, 3 per cent. Annealed at 500 deg. C., the figures were: Tensile strength, 28,900 lb. per sq. in., and hardness, 13. Quenched at 500 deg. C., the results were: Tensile strength, 32,200 lb. per sq. in.; hardness, 14 and elongation, 18 per cent. Alloys of this series did not show as much resistance to corrosion as the other alloys.

The alloys of the aluminum-magnesium-manganese series resisted corrosion in general better than those of the other series and this agrees with other experiences in the corrosion of such alloys. The heat-treated specimens of the aluminum-magnesium-copper series, however, were but little inferior to those of the manganese series in their resistance to corrosion; the annealed and the cold-rolled samples of that series were the least resistant to corrosion of any of the alloys tested. Hard-rolled commercial aluminum corroded much more than any of the alloys.

Duncannon, Pa., plant of the Lebanon Iron & Steel Co., Lebanon, Pa., resumed operations last week after having been closed last February. Approximately 300 men will be employed.



# Increasing Production to Meet Shorter Day

Foundry Expert's Suggestions—Production Machines Should be Made to Work and their Application be Extended—Use of Night Shift—Important Details

BY PAUL R. RAMP\*

**I**T does not require a mathematician to prove that a molder or a core-maker will produce more castings in 9-hr. than in 8, if they work under identical conditions and with the same equipment, or to prove that the labor cost per lb. will be greater on the 8-hr. basis than on the 9-hr.

To maintain production per man, with fewer hours, the foundrymen must be energetic in devising ways and means. A great many things can be done that will compensate for the shorter day, in many cases without additional expense.

If a careful analysis is made of a shop it will be surprising how many idle tools will be found, the use of which would do much toward increasing production. Molding and core-making machines must be used wherever possible. We must not hesitate over putting patterns on a machine simply because we cannot realize more than a 15 or 20 per cent increase, instead of the not unusual 100 per cent increase in production.

## Wider Use for Molding Machines

We must not keep patterns off the machines because we have only small quantities to make. We will find that although we are obliged to change patterns many times a day and that these changes take time and cut down the output of the machine, the molder or operator will be able to produce more with the machine at lower cost than when molding by hand. For this work one machine or more can be used. The cost of fitting patterns to the molding machines must be ignored more than it has been in the past. A careful check of the cost of fitting patterns to the machine for short orders will show that 80 per cent of these orders can be filled at a decided saving.

There are many patterns that can be made on the machines that do not require any fitting, and many of these castings are being molded daily by hand. These are plain jobs used for filling in to complete a molder's workday. And it is a great temptation to the foreman to keep them for that purpose, at the company's loss. But to keep the daily production per man up to the limit, the machine must receive first consideration.

Molders will produce more castings on a molding machine than they will by hand, hence the shop where handy men cannot be employed needs the molding machine just as much as the shop where unskilled labor is taught to operate it. Special set gates—skim gates, should be provided for all work. They save time and insure clean castings. The fact that a skilled molder is operating the machine or finishing the molds made on the machine must not cause us to neglect to provide these gates. While he may be competent to cut his gates and risers, he will be consuming time that will cut down the efficiency of the machine.

## Machines Can Save in Core Making

In the core-making department, nothing should be left undone toward having the cores machine made. Where power machines cannot be used, hand rock-overs will do good work.

Every working pattern and core box in the foundry should be inspected and instructions given as to how they should be used, regardless of the practice that may have been in vogue for years. This is absolutely necessary if we would beat the short hour day.

An inventory of working and idle molding machines should be the first step. An explanation as to why any are idle is then in order.

A canvass of all working jobs in the shop with a view to placing them on the idle machines should then be made, and action taken at once to have them put on the machine.

When every molding and core-making machine in the shop has been put into operation, the question of adding to equipment should then be considered.

In foundries where no molding machines have been used, the question of using them should be gone into very carefully. The machine builders who are willing to demonstrate what can be accomplished on their equipment should receive consideration. In this connection it should be said that the foundry owner who allows his foreman to apparently prove to him that he can produce just as many castings by hand as he can with a molding machine is being misled. Except in the molding of large pieces there are few cases of this kind.

## Foremen Should Be Encouraged to Better Methods

More earnest work should be done in the core-room to increase machine production. Instead of the core foreman selecting only core boxes that are adapted to machine operation, he should plan changes and alterations that will adapt others to machine work. Very often a core difficult to make becomes a simple machine operation. The progressive and wide-awake core-maker foreman will find these things. And when he finds them, his suggestion should have quick action.

The molder should be left molding all day and relieved of any work that can be done by unskilled labor. This makes arrangements for a pouring-off crew necessary. Assuming that the production is great enough to operate the cupolas from 9 a. m. until quitting time, the pouring gang must begin work at 9 a. m. and remain long enough after the molders have quit to finish pouring off.

When pouring is commenced in the morning a shake-out crew can be employed, thus reducing the flask equipment necessary, as many of the flasks can be used several times in one day.

In cases where the production will not be sufficient to justify all-day cupola operation, the molders can be allowed to mold all day, and the pouring crew constitute a part of the night crew. In this case the metal will come down about the time the molders are leaving the shop. The duties of the night crew will be to pour off all molds, shake out, take the castings out to the cleaning department and cut over the sand. Where a pouring crew is employed, the molders must be instructed to clamp their molds and build all runner basins required, as each mold is made, so that every mold will be ready to pour, rather than wait until the close of the day.

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as is done in usual practice. A good plan is to pour off after the molders leave the shop.

#### Pouring Large Castings Early

In foundries where many large pieces are made, the cupolas can be started early and all of the first metal put into the large molds, where, it will not interfere with the majority of the molders. This plan reduces the time necessary to keep the cupolas running at night or after the molders have left. We have operated a foundry after this plan with success. When the pouring is done after the molders leave the shop, one of the day foremen can be employed as night superintendent, and he need not be replaced, as the day men, having the burden of pouring taken off of their hands, should be able to supervise more molding operations. There are several plans that can be adopted that may fit into some shops better than those we have suggested.

To make the pouring crew a success special gates, gate cores, skim gates and other fool-proof pouring devices must be provided to minimize losses resulting from bad pouring. There is always more or less opposition to a pouring crew, and a disposition to hold it responsible for defects, but it is important that this operation be taken away from the molder.

#### Work of Night Crew Effective

The work of the night crew—the men who take out the castings, cut over the sand and clean up the shop ready for the next day—will have a great influence on the production per man in the molding room. It should receive a great deal of attention. The details of the work must be carefully gone into. It is of importance that everything is in readiness for the molder to begin molding as soon as the whistle blows. When it is possible, we advise having the molding room wired for sand cutting machines. No one can afford to have molders lose time recutting their sand in the morning. When this sand cutting is done by hand, a day very seldom passes when there is not a certain percentage of sand heaps that must be retempered, which means a corresponding percentage of reduction in output per man.

There is no question regarding the quality of the sand when it has been prepared by the sand cutter, and it is impossible to duplicate it with the very best hand work, to say nothing of the saving in labor.

A properly tempered sand heap starts the molder producing at once. Give a man a good start in the morning and he will give you a good production. If he does not, you have the wrong supervision. The night crew must see that all flasks that are being used by the molders are piled systematically on the floor, so no time will be lost sorting them out. They must be placed as conveniently as possible for the molder to reach. Gagers, rods, loose bars and similar parts must be sorted out and placed in their proper place to further expedite the molders' production. All of this work can be done very nicely by the night crew if it is properly organized and under intelligent supervision, and every detail is very important to production.

#### Of Molders' Time, 20 Per Cent Lost

A check of a molder's movements during his day of 8-hr. will show that he is molding about 80 per cent of the time, although his sand has been cut, his cores delivered, the flasks brought to his floor and his molds poured. The other 20 per cent of his time is consumed doing things that could

be done by unskilled help or need not be done at all. This 20 per cent represents a 20 per cent reduction in output.

In a reasonably large shop the electric truck for the quick transportation of castings from the floors to the cleaning room, of gates and risers and other foundry scrap to the cupola, of molding sands to the floors and refuse sands to the dump, for the moving of flasks in and out of the shop, and the delivery of heavy cores from the core department to the molding floor, cannot be equaled. When these trucks are operated in connection with a sufficient number of skids, they reduce the cost of transportation greatly and aid the night crew in getting the shop cleaned up early. These trucks should be used to handle pig iron and coke also. In their use for any of the operations mentioned we have realized a saving in unskilled labor of from 75 to 80 per cent, and the work was done much faster. The man in charge of the night crew should be provided with instructions covering every detail of the work.

There is no question but that a well organized night crew will help the production. In the past not enough study has been given to this department. I believe I am safe in saying that if any foundryman would devote a little time to this part of his organization, he would find that wonders could be done if a few hard and fast rules were established. That one item will help to beat the short hour day.

#### Attention to Patterns and Core Boxes

Patterns and core boxes should receive more attention. They must be constructed in such a manner as to simplify the molding and the core-making. Repairs to patterns must be made promptly. It is cheaper to work the pattern shop overtime to repair a pattern than it is to pay a molder to patch up a poor mold caused by a defect in the pattern.

Core boxes must be made that will produce cores that do not have to be filed by the molder before they will fit the mold. Production is reduced about 10 per cent in the majority of foundries simply because the cores do not fit the molds for which they are intended. After the first core is made it should be checked up to determine how much it swells or sags, then a few alterations in the box can be made that will take care of this variation and give the molder a core that will not require any filing and fitting.

The coremaker must be given the same attention as the molder, with a view to relieving him of all work that can be done by unskilled help. He must have his sand brought to his bench, and his rods straightened and cut to suit the work he is doing. A handy man must be employed to take all cores from the maker's bench to the oven, and bring back empty plates or driers. One man will serve quite a number of core-makers in this capacity. The fitting, joining and blacking of cores should be done independent of the core-maker. All of the work to be done in the core department the following day should be planned the day previous. This will give time for inspecting the boxes, getting the driers and plates together and bending and cutting the rods. When these details are attended to the core-maker finds his job waiting for him when he arrives in the morning and he can begin to make cores at once. There are very few men who will not willingly increase their daily production if all of these details are attended to for them. However, there is always the danger of making a workman lazy if we do not take the



trouble to make him understand what is expected of him. It is up to supervision to make all efforts along these lines a paying proposition.

#### Miscellaneous Details That Help

The molder and the coremaker must be given the first attention, but there are many other leaks that should be cared for. The cleaning room that has not used air chippers had better get them. The portable grinder saves many dollars in the majority of shops. The arrangement of the tumblers must be such as to avoid handling the same casting too many times.

The cupola labor can probably be reduced with

some additional equipment, and sometimes without expense—just a little planning.

A more careful study of the molding sands will help to increase production.

A standardizing of the facing mixtures is another item to be considered.

The main idea is to start a campaign of self-examination first, and get all we can reasonably expect out of our present shop and equipment, then to look about us for other things as circumstances permit.

The supervision will be responsible for the success or failure of the effort, just as it is responsible for some of the present leaks.

## Maintaining an Engineering Force in Dull Times

### Unproductive Salary Payments Charged Off As an Investment in Organization—Elements of Staff Building

WHEN any of the technical or executive staff of Westinghouse, Church, Kerr & Co., Inc., New York,—such as an engineer, a superintendent, a foreman, or a draftsman—is detailed on a job, the job is charged with his salary for the actual time he is on it, and no more, according to J. C. Boyd, vice-president, in an article in *System* descriptive of the company's payroll policy. In explanation, he stated: "We add no margin for the client to pay, on account of time which the man may be idle or may have been idle in the past in order to be ready for such jobs. If there is any idleness, it becomes a charge against our profits—against the sum of our percentages on the costs of this and other jobs. For all our work is done on the cost-plus basis.

"By proper management and by operating in many parts of the world, so that depression in one place is apt to be offset by activity in another, we find that idle time can usually be avoided. When it cannot we regard the charge against profits as an investment in organization.

"For several months of the year 1914-15, we had red figures on our balance sheet from following this policy. When there was every temptation to cut our force as much as possible, we faced in the opposite direction. We spent our time figuring out ways to keep the force as big as possible. There were some discharges. We couldn't avoid them. But we managed to keep together an executive and technical force of 350 men, during all those months when there was practically nothing to do.

"There was nothing merely humanitarian in this. It looked like good business to us. And that is what it proved to be. When the tide turned in 1915, we were ready. We had none of the tribulation of building up and working with a new organization. True, we had to take on thousands, tens of thousands of new men. But everywhere over them and among them were men who were used to working with one another, men who knew our way of doing things, men whose abilities we knew.

"And these men were not only already broken in; nearly all of them stayed with us, in spite of the fancy war salaries that were offered to hundreds of them. They were loyal for the simple reason that we had been loyal to them. I do not think they were any more sentimental in this than we had been in keeping them on the payroll during the dull year. That year and other periods of depression which they had passed through with us had brought home to them the value of permanent employment.

"I regard the transmission of a sense of economic security to the members of a force as a preliminary to organization, as something which must be done before the force can really be organized.

"The three points to me in organization building are these:

"1. Give an economic security by not being afraid to cut into profits.

"2. Make honest work the standard and the measure of ability; that will breed organization honesty.

"3. Give plenty of responsibility to the individual and guide him rather than force him through supervision. Make supervision a mutual and not a zone affair which will banish the "no man's land" that sometimes stretches between departments."

### Prizes for Analyses of Lakewood Truck Operation

As an inducement to industrial plant managers, engineers and others to study their inter-department transportation problems and more fully realize the economies of industrial tractors and trucks, an offer of awards of \$1000, \$500 and \$250 for the three best analyses of the application of their new tier-lift truck is announced by the Lakewood Engineering Co., Cleveland. The award committee, appointed by the Society of Industrial Engineers, consists of: A. Russell Bond, editor *Scientific American Supplement*, New York, chairman; Prof. Dexter S. Kimball, Dean of the School of Engineering, Cornell University, Ithaca, N. Y.; and Irving A. Berndt, vice-president C. E. Knoepfel & Co., New York. All papers must be in the hands of the chairman by Jan. 30, 1920. The awards will be made prior to Feb. 28. Details of the contest will be sent by the Lakewood Engineering Co., Cleveland, upon request. The contest is open to all except its own employees.

### Will Discuss Trade Terms

The National Foreign Trade Council will shortly call a meeting of committees representing American trade organizations, for the purpose of defining trade terms in common use, such as f. o. b. mill or yard and c. i. f. port. At the convention, which will be held at the India House, New York, will be representatives of the Bureau of Foreign and Domestic Commerce and the definitions agreed upon will probably be adopted as a standard by the Government. These will be published in the languages of nations engaged in trade with the United States. Some difficulty has been encountered with the different interpretations of trade expressions and when an unauthorized pamphlet was found in Australia purporting to give accurate definitions, it was decided to take action.

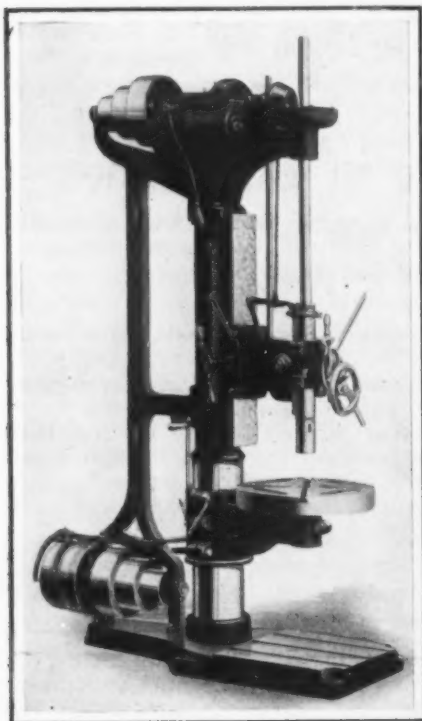
Work at the Saco-Lowell Shops, Lowell, Mass., practically has been suspended owing to a strike of some 1500 of the 2000 employees, whose demands for a general wage increase of 10c. per hr. were refused by the management.

## Sliding Head Drilling Machine

A new sliding head drilling machine with positive geared feed and 24-in. swing is announced by the Sibley Machine Co., South Bend, Ind. This machine, it is explained, incorporates all the proven features of the company's older models, with the addition of some new features. The length of bearings on head and arm have been increased to give added strength and accuracy. The head and spindle are balanced by a weight supported inside the column with Diamond chain operating over large diameter sheaves. The gears have been

enclosed for safety of the operator and belt guards can be furnished.

A feature emphasized is the fitting of all drive shaft bearings with die-cast split bushings of anti-friction metal. These bushings are interchangeable, thus to insure long life to the bearings and easy replacement. Three-step cones carry a 3 $\frac{1}{4}$ -in. belt which with the bevel gear ratio of 1 to 2 and back gear ratio of 1 to 4 $\frac{1}{4}$  is emphasized as supplying abundant power to the spindle. The back



Balanced Head and Spindle, Enclosed Gears and a New Geared Feed Are Among the Features Embodied in This New Sibley Drilling Machine

gears are of the sliding type, fully enclosed and operated by a single lever.

Another feature emphasized is the new geared feed with four changes and a neutral position. Feed changes are obtained by moving a knob located in the center of the hand wheel in connection with a sliding spline, four feeds being provided for each spindle speed. The initial drive of the feed shaft is from the top cone shaft through spur gears and 2 to 1 spirals, the latter bronze and steel respectively. The gears run in an oil bath and are completely enclosed. The steel worm which meshes with the large worm gear also runs in an oil pocket. The adjustable automatic stop is of new design and is explained as being quick and positive in action. Hand feed and quick return of the spindle is furnished by a three-lever spider at the right of the feed box.

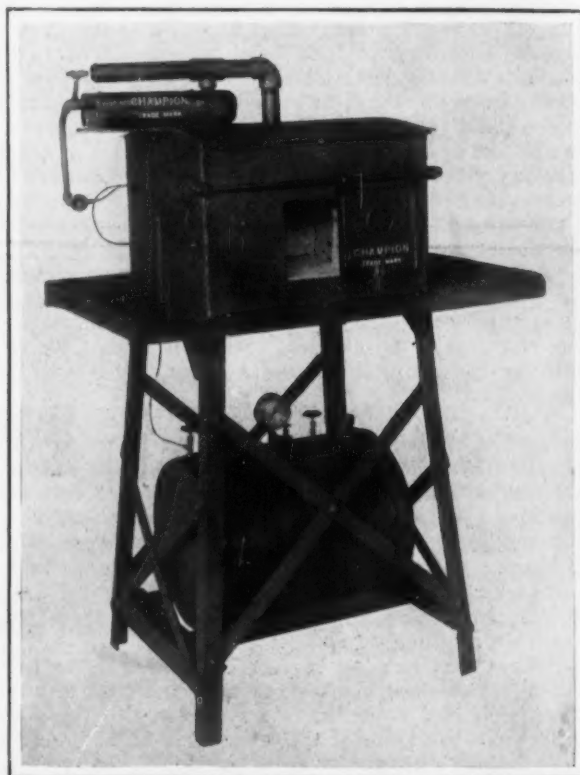
All bearings are equipped with oil cups, grooves and channels. The loose pulley is self oiling and, it is stated, will run several months without attention. All feed gears in the feed case are completely enclosed and run in oil. A positive geared tapping attachment, geared or belted motor drive, round or square tables with tee slots and oil pocket, oil pump outfit and quarter turn countershaft, can be furnished if desired.

The principal dimensions of the machine are as follows: Maximum distance, spindle to base, 52 $\frac{1}{2}$  in.; maximum distance, spindle to table, 35 $\frac{1}{2}$  in.; traverse of table on column, 13 in.; traverse of head on column, 25 in.; diameter of table, 21 $\frac{1}{2}$  in.; feed of spindle, 10 $\frac{1}{2}$  in.; Morse taper hole in spindle, 4 in.; spindle speeds, 29-88-116; spindle speeds, r.p.m., 126-250-495; positive geared feeds in thousands per rev. of spindle, 6, 12, 15, 20; horsepower required for maximum duty, 3; working surface of base plate, 21 $\frac{1}{2}$  x 20 $\frac{1}{2}$  in.

## Kerosene-Fired Heating Furnace

A new type of portable kerosene-fired furnace entirely self-contained and designed for heating rivets, heat treating tools, and for other operations, has been brought out by the Champion Kerosene Burner Co., Kenton, Ohio. It is claimed for this furnace that it provides a temperature up to 3000 deg. Fahr., generated in 5 min., and that it is economical in operation. The kerosene is transformed to gas before being ignited, and it is stated that the flame burns without a trace of hydrogen, or, in other words, the flame is non-oxidizing.

Attention is called to the advantages of the self-contained feature of the furnace. A fuel storage tank is located on a lower platform of the stand, tanks of various sizes being provided, depending on the use to which the furnace is to be put. It is stated that for the general run of work one filling of the reservoir is sufficient to operate the furnace for a 10-hr. day, and that no pipe connections need be installed. The furnace can be lifted by crane with the flame burning, and placed where needed. Compressed air at the pressure of 80 to 90 lb. per sq. in. forces the fuel from the storage tank to the burner, which is located just above the hearth. The air is forced into the tank by an ordinary air pressure hose or by a pump if an air line is not available. A pressure gage is provided at the top of the tank. It is pointed out that while fuel is being drawn



Compressed Air Forces the Kerosene From the Storage Tank to the Burner of This Heating Furnace. The flame is stated to be non-oxidizing.

from the tank the air pressure remains adequate to properly feed the burner and only in exceptional cases does additional air have to be supplied after this has been taken care of in the morning. The rapidity with which the furnace may be heated obviates the necessity of an operator waiting 20 to 30 min. to get his furnace ready for work. It is stated that the maximum kerosene consumption will not exceed  $\frac{3}{4}$  gal. per hr.

Among advantages claimed for the furnace is that its non-oxidizing feature permits the leaving of work in the furnace for an indefinite period without danger of its burning up. It is explained that an entire keg of rivets can be dumped into the hearth and those for immediate use can be placed directly under the flame, while the others in a semi-heated condition can be raked in as needed. The furnace is being made in various sizes, provided with one or more burners.



# Industrial Democracy and the Foreman

## The Latter the Link Between Management and Production—His Failings Eliminated by Training

THE development among workingmen of a proper understanding of the economic forces affecting industry may be most logically accomplished by first teaching these fundamentals to the foremen, according to the analysis of the situation presented before the convention of the American Foundrymen's Association at Philadelphia, Sept. 29, by John Calder, consulting engineer, New York. Among other points he emphasizes the following:

We can no longer live industrially in compartments. The safety man, the foundry foreman, the employment manager and all others who touch industry on its social side must, in the opinion of the writer, fuse their efforts effectively with other foremen, superintendents, employers and employees on a plan that permits of self-expression and self-determination on the part of the workman in everything that touches his industrial interests.

Modern production methods at their best, though calculated to increase individual and national well-being, will not of themselves produce industrial contentment. Economic friction, even in the best-ordered industrial families, is the inevitable price we must pay for a democratic basis of existence and the great majority of us are convinced that it is well worth the price. In fact we have really no choice in the matter. It is quite useless in our day to fence off any large portion of human activities and interests and declare that self-expression and self-determination may not operate there. Yet the plain facts of our industrial relations are so overlaid by various theories of reconstructing them that the public and many executives are bewildered and are asking for a precise answer to the question, "What does the workman want?"

### What the Workman Wants

The facts about modern management and industrial unrest are briefly these: Not due primarily to the great war but simply intensified by it, the worker is putting forward new claims for consideration and also some old ones which had not been generally conceded.

The workman demands more liberty in industry—a share in the policies of management so far as they touch his interests. In so doing he rarely adopts any one of the schemes of social reconstruction which are pressed upon his attention to-day, nor does he mean to dispense with or overrule the superior ability, knowledge and experience admittedly necessary in the general conduct of a plant by its managers and owners.

There are schemes which propose to lay violent hands on all capital with no adequate care for skilled direction, but the workman's desire is for a change in the *spirit* of industry, and that change is being welcomed by all thoughtful owners and executives.

The workman wants to be treated as an intelligent participator in industry, not merely as the seller of a commodity. He wants to be consulted, to have some things explained to him in the first instance, not merely thrown at him or arbitrarily imposed on him by bulletins, orders or decisions to which he was not a party.

To this the employer and foreman, still mentally in the last century, say "Can't we do anything we like with our *own* things and plans in our *own* plant?" The answer is that there is no law against trying it, but that, if we are wise, we won't attempt to play a lone hand with the personal interests of others.

This desire of the workman is often voiced in his own plant, and to his own foreman, even when it does not reach his employer, and it is always latent to-day. Too often, for lack of an opportunity to express himself to his employer, it is voiced for him by people outside of his daily round, some of whom misrepresent

him and are not at all scrupulous about writing between the lines things which the workman is not asking for.

The desire of the workman to have such representation as he pleases on all matters affecting him seems a reasonable and laudable claim and employers following modern production methods and management at their best must concede it. If they are wise they will welcome it, and those who are do so.

When the machinery in any plant does not exist for easy expression of employee opinion and desire, or when supervisors and foremen deal arbitrarily with it, workmen are gradually convinced that democracy is forbidden and are driven to express themselves through outside organization and mass action upon issues which sometimes concern only a few of their number. Often such a result is the effect of deliberate company policy, but sometimes the supervisor undertakes to suppress employee opinion for a while, only to have a more serious issue ultimately forced upon his employer through his mistaken action.

Under such conditions . . . the ultimate remedy is not to fight and, if possible, defeat such organized forces in your own plant, but to confer real responsibility by taking your people into consultation. This may seem an obvious procedure, but on the testimony of many foremen it is frequently omitted.

This much, at least, is probable, that hopeful expectations from the institution of works' councils and of committee representations, can only be reasonably entertained when the foremen and executives who represent the ownership in such bodies are competently informed, energized, sympathetic and keenly desirous to get at the truth and to solve all difficulties on the sound economic grounds which alone insure permanent settlements.

### Economic Education of Foremen Essential

An analysis of the intelligence and perceptions of the many executives with whom personal contacts have been made has convinced the writer that they will never be educated economically merely by membership in such councils. It is absolutely necessary that our foremen should bring economic education into such meetings.

Some of the smaller employers need the training as much as do their men, and all employers would benefit from hearing their foremen talk out in the privacy of the family circle on topics not usually discussed in their business conferences, but vital to the business, none the less. It is quite evident that not a few concerns have failed to sell their policies to their own foremen, and to their considerable loss.

Much of this is due to the fact that many chief executives are poor mixers and have no gift for imparting information to people of a different educational standard. It was also found that some foremen in industry actually think less about industrial relations and know less than some of their own workmen and the low educational caliber in economic matters of the foremen in most of our industries is remarkable, considering the effective part they might play in happily and justly reconciling not a few industrial differences at their inception.

This is not wholly or chiefly the fault of the foremen. They are usually selected largely for their technical proficiency in their own particular branch and then are forgotten by the management so far as the engineering of men is concerned. Even where they have been theoretically assented to, such things in practice are purely secondary matters with many employers. The number of plants with good policies and poor practice in this respect is remarkable and has led

to the organization of an effective service in this direction.

The generous treatment of foremen and the steady drawing-out of their capacities for leadership and for interpreting to workmen the policies and ideals of liberal-minded owners is the open secret of some of our most happy and contented businesses.

#### How the Workman Thinks

What do we find when the workman gets representation and comes down to details? What is the attitude of mind he discloses? These conferences have shown that some of his unrest vanishes readily before personal contact and vanishes for good, but we also find that he entertains fallacies and misconceptions about industry to which he clings tenaciously, and to which many of our foremen, who are frequently the sole source of enlightenment, are not qualified to make an adequate response.

#### What Our Foremen Lack

It is our experience that large numbers of foremen ranging from 25 to 65 years of age can be sufficiently educated in a very short time by intensive processes to appreciate the industrial economics and human engineering of their job and to apply such teaching with enthusiasm in their daily routine.

Certain it is that no ideas which we fail to sell to our foremen can be permanently conveyed to our workmen, and while a wealth of endeavor is being expended on the moving soil of labor at present we should not overlook the permanency of a liberal investment in the education of our numerous minor executives.

Apart from technical proficiency, our extensive survey has revealed the same lack of training in the methods and principles of modern production as it did in handling men. Production methods are being increasingly elaborated by experts and converted into systems of operation, but it is generally admitted by employers that unless these are related in the minds of the foremen to general industrial practice they awaken little interest.

Education for leadership in handling men and things has usually been concentrated on young men preparing for the higher positions, but the workman makes his contacts and has most of his differences with the foreman and judges his employer accordingly.

For over a year intensive three-month courses have been given to several thousand foremen and executives in many plant groups. These have covered personal development, handling men, production principles and industrial economics; not in academic form, but through four special channels, namely: Simple brief texts specially written for foremen; practical problems of lead-

ership on which they correspond; lectures at intervals of two weeks to each group; and open discussions after lectures at which any topic is admissible.

The method is the Plattsburgh one of short intensive training. It is found that any group of associated foremen can be effectively held together for that time with increasing interest. They have not the zest of adolescents for long-continued studies, but they do respond to interesting brief courses.

The reactions of executives in widely differing industries in the discussions have been remarkable. Apparently no such opportunity has ever been afforded them though there is much about which they are curious. They practically talk on the same topics and many employers have testified that such an intellectual awakening has served many of the purposes of "a council of the whole" for the foremen of their plants.

A number of the classes have permanently organized on this basis. In the small plants it has been felt that such an enlightened, energized body of foremen in any concern might well form with the mass of the employees "a committee of the whole" on all industrial relations.

#### Conclusions

The relation of industry to the four partners concerned, namely labor, capital, brains and public interest, was studied in each class of foremen with special reference to the conditions of harmony and productiveness. Here are the conclusions arrived at:

The workman will be contented as a rule if he obtains:

1. Security of employment.
2. A voice in fixing employment conditions.
3. A fair share of the profits.
4. Working hours yielding reasonable leisure.
5. Prevention of profiteering.
6. Suitable housing and welfare provision.
7. Economic instruction.
8. Opportunity to rise.

The contented workman will co-operate if there is:

1. Elimination of all suspicion of his employer.
2. Creation of confidence between him and the executives.
3. Recognition of mutual interest in industry.
4. Creation of machinery for facilitating acquaintance.
5. Absence of all paternalism in industrial relations.

The contented and co-operative employee will be exceptionally efficient and productive if he is scientifically directed with special incentives, modern methods and appliances and if he ignores all labor restrictions on output and narrow trade demarcations.

#### Care of Foundry Equipment

The importance of taking the proper care of foundry equipment was emphasized by G. L. Grimes, Grimes Molding Machine Co., Detroit, in a paper on the care of foundry equipment, presented before the recent convention of the American Foundrymen's Association, Philadelphia. "In many cases," he said, "the machinery is purchased, and no more attention is paid to it as long as it runs. The foundry process is a dirty one. The sand and dust that flies when the molds are being shaken out covers everything in the foundry, and many foundrymen act as if it is useless to attempt to keep machinery clean. When installing equipment, many neglect to provide a proper place for it. Think of installing a motor driven air compressor in the dust of the cleaning room! But it is done. Some foundrymen allow the night gang to shovel the sand back, covering the molding machines so that the operators have to dig them out every morning. This delays production and damages the machines."

The average foundry, Mr. Grimes stated, depends on the handy man flask carpenter to oil and repair the machinery. "It is absurd," he said, "to think that the flask carpenter can take care of the electric crane, air

compressor, sand cutter and molding machines. In the first place, he does not have time, and in the second place he seldom has had the proper training."

The logical and cheapest way to reduce the foundryman's worry, Mr. Grimes pointed out, is to hire a competent master mechanic or upkeep man to look after the mechanical details of the equipment in the foundry, as is done in rolling mills, machine shops, paper mills, etc. "The combination of foundry sand, dust and oil is real dirt," he said. "The man who works in it and who takes care of machinery properly is entitled to a fair wage. The man who knows the condition of all equipment and can head off trouble in the foundry is a valuable asset to a foundry. With the installation of sand handling machinery, conveyors, etc., where the breakdown of one conveyor shuts down the whole foundry, managers are beginning to realize that upkeep is as important in the foundry as in the machine shop. However, the large majority of foundries have not yet reached this point."

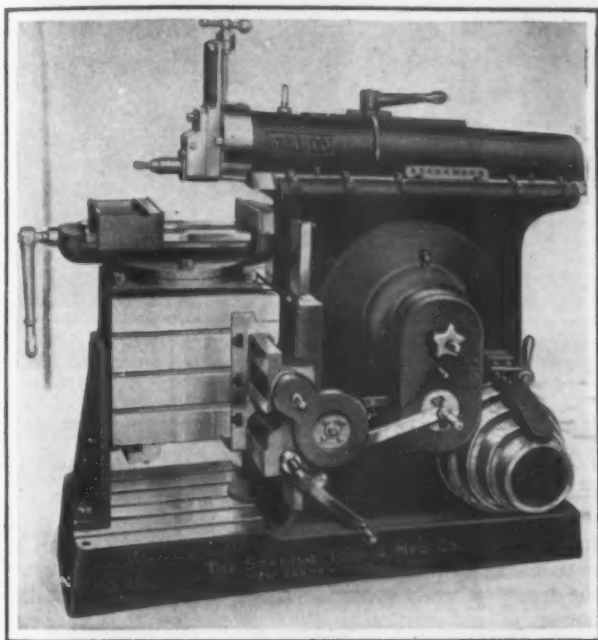
The Moore Drop Forging Co., Springfield, Mass., has acquired all common stock of the Page-Storms Drop Forge Co., Chicopee, Mass., and will make purchases for both plants hereafter.



## New Shaping Machine

A shaping machine which, it is stated, incorporates a number of new features in its design has recently been placed on the market by the Streine Tool & Mfg. Co., New Bremen, Ohio. The base of the machine is of the extended type and has T slots which run back to the column. The column is emphasized as being extra deep and of extra width at the base, thus to make a more rigid joint between the base and the column and resulting in a lower center of gravity for the machine.

The bull gear bearing is cast solid in the frame and is made large, thus to reduce wear. It is supported close



This Shaping Machine Is Explained as Having the Column Designed Extra Strong with Lowered Center of Gravity, and with Crank Block and Its Adjusting Mechanism Constructed to Eliminate Chatter

to the rim by the frame itself to prevent its binding or breaking away from the hub. The total area of the bull gear bearings is 205 sq. in. The crank block and its adjusting mechanism are set into the bull gear so as to reduce the overhang between the rocker arm and bull gear to a minimum. The construction of the bull gear and its relation to the rocker arm is explained as doing away with chatter without making the working parts heavy and cumbersome. The bull pinion has extended hubs on which the intermediate gears are mounted, rotating on bronze bushings as in planing machine construction.

The driving gears are mounted on a long sleeve which slides on a key in the pulley shaft. The ratio of the gearing is arranged so that the speeds of the ram are in geometric progression. It is pointed out there are no conflicting gear ratios as in the single gear drive type of some shaping machines. The pulley rotates in a sleeve bearing, bolted to the column, thus to relieve the shaft of the belt pull and to eliminate extra bearing. All undue strain is thus taken off the shafts.

The rail is clamped to a dovetail slide on the column, thus making for accuracy in any position. This is the same as in milling machine construction. The saddle fits into a narrow guide on the rail so as to provide large wearing surfaces and to equalize the strain on the rail screw. The table is hooked over the saddle in such a way that the strain on the table has a tendency to tighten the joint and relieve the table bolts of thrust. The table support is at the extreme outer end of the table. The table elevating screw is of telescopic construction provided with ball thrust bearing and is out of the way of chips and dirt. The table can be removed and large work bolted to the saddle or base.

The feed can be varied or reversed while the machine is in motion and can be quickly set to the desired amount. All adjusting screws have micrometer collars graduated to 0.001 in. The head and vise are

graduated in degrees and they can be set at any angle.

The general specifications of the machine are as follows: Length of stroke, 17 in.; cross feed of table, 24 in.; vertical feed of table, 15 in.; greatest distance of table to ram, 16 in.; size of tool,  $\frac{3}{4}$  by  $1\frac{1}{4}$  in.; feed of tool, 7 in.; diameter of head, 8 in.; vise jaws,  $12 \times 2\frac{1}{4}$  in.; opening of vise,  $12\frac{1}{2}$  in.; cone changes, 4; machine belt,  $2\frac{1}{2}$  in.; speeds to ram, 8; strokes per min., 6 to 120.

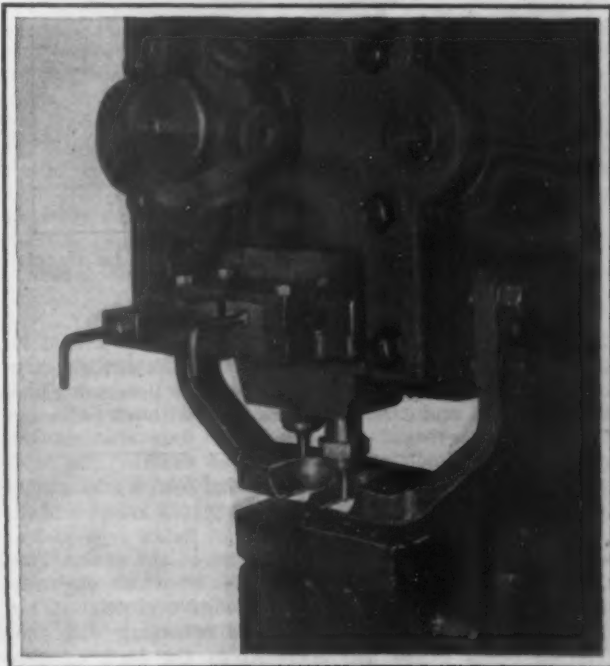
## Investigation of Semi-Steel Shells

WASHINGTON, Dec. 16.—Although the ending of the war has made its research less important, the steel industry has considerable interest in the tests which the Bureau of Standards has made on semi-steel shells which were being produced in the closing days of the war. These have been subjected to a thorough examination, says the annual report of the Bureau of Standards, as to mechanical, chemical and metallurgical properties. In order to determine the probable stresses set up in the shells that showed excessive expansion after firing, tests were made to determine the true elastic limit or the stress at which permanent deformation is first produced. Further, a study was made of the variation in the chemical and mechanical properties throughout the length of the shell. It was found that the strength of the material, its hardness and the percentage of combined carbon decreased consistently from the thin section of the nose of the shell to the heavy fuse sections. This agrees with what might be expected from such a material as semi-steel. The entire series of tests on semi-steel shells also indicate that at present there is considerable variation in the mechanical properties and chemical composition of so-called semi-steel.

## Spring Lifts Punch Clear of Material

Each stem of the double gagged punching attachment shown in the accompanying illustration is fitted with a spring to lift the punch clear of the material when the gag is withdrawn. Each gag is individually operated and has a long taper end so that when the gag is inserted the taper end acts as a wedge and forces the punch stem down.

This attachment is explained by the manufacturer, the Cleveland Punch & Shear Works, Cleveland, as



A Spring on Each Stem of This Double Gagged Punching Attachment Lifts the Punch Clear of the Material When the Gag Is Withdrawn

being desirable when used with a spacing table and when the plate has two sizes of holes, as one punch stem will be entirely clear of the material even when the plunger is at the bottom of its stroke. There is, therefore, no interference or dragging of the disengaged member. The centers are fixed.

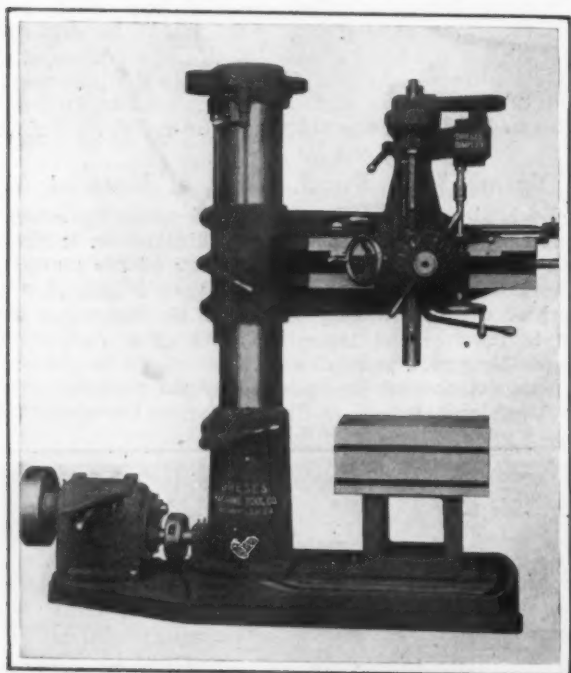
## New Radial Drilling Machine

Simplex radial drilling machines, built in 2 ft., 2½ ft. and 3 ft. sizes, are the latest product of the Dreses Machine Tool Co., Cincinnati.

These machines are designed for high speed, heavy duty and for ease of operation. It is explained that all mechanisms are simplified so as to reduce wear and to reduce chances of the machine getting out of order, without sacrificing features making for rapid production. Noiseless running is pointed out as one of the principal features, obtained by helical gear drive and meshing metal with fabric gears.

The outer column swings on a fixed inner column reaching to the top. Both are enlarged at the lower end and have a third bearing in the middle thus to give strength and rigidity. The clamping handle follows the arm and is always in reach of the operator. The outer column rests on a ball thrust bearing on top of the inner column to make for ease in swinging the arm.

The arm is of parabolic shape and the lower rib is double webbed to resist bending and torsional strain. It is raised and lowered at a ratio of 2 to 1 by a conveniently located handle, which is locked to avoid accidental engagement. The head has long and wide bearings on the arm and moves by means of a spiral pinion. The clamping is by a lever which operates two screws.



Heavy Duty Radial Drilling Machine Designed for Rapid Production. Ease of operation and simplified mechanism are features emphasized

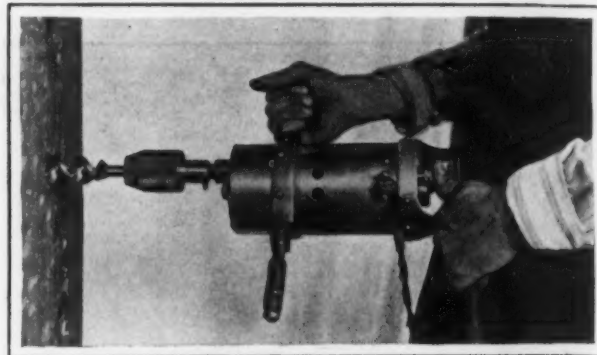
The spindle runs in bronze bearings and the thrust is taken up by a ball bearing. The rack is cut directly on the bar steel sleeve, which brings the pressure close to the center and affords a wire rack without reducing the sleeve bearing. The feed has four changes by means of the knob on the head feed shaft. The feed worm runs in an oil bath and the hand feed works ahead of the power feed. Feed and speed plates are provided.

The automatic stop is of the dial index type and a safety release is provided at the end of the rack. The quick return has two handles, either of which engages and disengages by means of a positive clutch. The frictions for starting, stopping and reversing with the friction bevel gears are enclosed in the back of the head and run in an oil bath. The speed variator has six changes and a novel shock absorbing coupling overcomes the jar when changing. The gears in the speed variator are of the 20 deg. pointed type to provide strength and ease of engagement.

The principal dimensions of the 2½-ft. machine are as follows: Range under spindle, 51 in.; traverse of spindle, 11 in., and diameter of column, 9 in. Four feeds are provided, 0.007 in. to 0.018 in., with 12 speeds ranging from 83 to 575 rpm.

## Electric Wrench, Drill and Screw Driver

A combination tool for use as a wrench, drill or screw driver, is announced by Harold Hollingshead, 55 Liberty Street, New York. A small high speed electric motor controlled by a rheostat is encased in a metal cylinder with specially arranged steel worms and gears. All the parts are set on ball bearings together with a specially constructed clutch having serrated teeth. The clutch has an adjustable pressure of from 10 to 60 lb., this pressure being taken from a 10 in. leverage. This operates to give a predetermined



Combination Tool Shown Drilling a 1¼-in. Hole in Oak. It is motor driven and can be used also as a wrench and screw driver

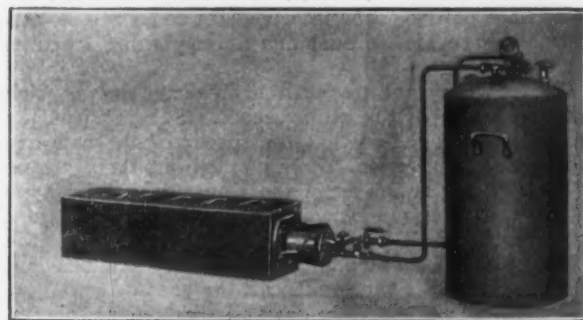
torque, but automatically ceases to operate when such a limit is reached.

It is explained that a mechanical device prevents the tool from stripping the screw thread or breaking the bolts or damaging the wrench when the screw or nut is fully seated. The chuck can be placed in the clutch so that it will automatically release the screw driver when the screw is firmly seated. When used as a wrench the power is automatically shut off after the nut has reached its intended position.

The machine weighs about 14 lb. The body is 10 in. long and 4 in. in diameter and develops from 3 to 5 hp. in torsion. The motor operates in either direction, having three speeds forward and three speeds in reverse, on direct or alternating current at 110 to 120 volts.

## A New Way to Heat Small Ladles

A practical arrangement for heating a number of small ladles at a time, is shown in the accompanying illustration. The device consists of a sheet-iron box reinforced with angle iron and lined with fire brick, a Hauck furnace burner and a 20-gal. steel oil tank.



A Number of Small Ladles Can Be Heated at One Time with This Burner

The ladles are placed bottom up over the opening of the box and the flame of the oil burner shoots up through the openings. The fire box can be made any desired length to heat any number of ladles.

The burner consumes any grade of fuel, crude or kerosene oil in connection with compressed air at 20 to 100 lb. pressure. The burner is supplied with a regulating valve and is mounted on a flange which is bolted to one end of the box. The steel tank is equipped with a 150-lb. gage, oil and air regulating valves. The connections between the burner and the tank can be made with pipe. This is a recent development of the Hauck Mfg. Co., Brooklyn, N. Y.



## Use of Steel in Cupola Mixtures

Discussing semi-steel and the amount of steel to be used in a cupola mixture, W. J. Mulcahy in the August issue of *Metal Trades* has the following to offer in a brief article, "The Use of Steel in Cupola Mixtures:"

Steel should always be melted in the cupola, as any appreciable amount added to the ladle will have a tendency to chill the iron to such an extent that poor results will follow. Steel scrap should not be of too heavy a section, as steel has a higher melting point than cast iron.

The amount of steel that can be used with the best results will depend on the thickness of metal to be cast and the other materials that are to be used. On light sections and with low silicon pig, much less steel should be used than when the castings to be made are of heavier sections and higher silicon pig is being melted. From this statement it must not be construed that the silicon content is the only element to be taken into consideration when making semi-steel. In some cases 5 or 10 per cent steel will have the desired effect, while in other cases 25 or 30 per cent would be more desirable.

Generally speaking, 25 per cent is about the maximum amount used with the best general results. I have on several occasions used as high as 40 per cent, although it was not through choice, but because it was necessary with the material on hand. The great danger from large proportions of steel is sluggish iron and abnormal shrinkage. For the best results, steel should be melted with a low blast, and in a cupola that has a large tuyera area as compared to the area of the cupola.

Steel adds strength to cast iron principally because it reduces the silicon content, reduces the phosphorus, and reduces the total carbon. It will therefore produce a metal lower in graphitic carbon and higher in combined carbon. Of course, the percentage of combined carbon will depend upon the section of metal, the pouring temperature, and the other elements. When figuring a mixture, it is safe to assume that no silicon is present in the steel scrap, providing a rolled steel is used. All rolled steel has a small amount of silicon, but after the oxidation has taken place in the cupola, so little is left that it will have no bearing on the finished result. If cast steel is used, the estimated figure to be considered should be 0.30 per cent silicon. A fair average analysis to be used for estimating purposes would be as follows:

Rolled Steel		Cast Steel	
	Per Cent		Per Cent
Silicon .....	0.00	Silicon .....	0.30
Manganese .....	0.50	Manganese .....	0.50
Phosphorus .....	0.04	Phosphorus .....	0.05
Sulphur .....	0.05	Sulphur .....	0.05
Carbon .....	0.20	Carbon .....	0.25

Steel has some decided benefits in certain classes of work, principally in producing castings that have to stand a test, and where a metal of great strength is desired. Where cast iron is being produced that must have exceptionally good machining qualities, steel has no place in the mixtures.

## Protecting Soot Cleaner Elements

A method for protecting soot cleaner elements against high temperatures of combustion by means of so-called dead gas pockets is announced by the Vulcan Soot Cleaner Co., Du Bois, Pa. This protection is for steep tube boilers which require cleaner elements at the bottom and top of the first pass.

A patented deflecting baffle tile, or row of fire brick forming a pocket in which the element is operated, is placed at the bottom of the first pass, thus to eliminate the direct scrubbing action of the hot gases. Space is allowed at the bottom of this baffle through which soot and ash will drop during the cleaning process. Cast-iron sheathing is used for further covering and protecting the element.

Another dead gas pocket in which is located the second soot cleaner element is placed at the top of the first pass. This element is also further protected by special cast-iron sheathing. The element rests upon

the circulating tubes close to the front drum, contact with the comparatively cool tubes assisting in maintaining the element at a safe temperature. By arching the baffle tile over the circulating tubes, the hot gases, in their natural flow, do not come into direct contact with the element.

## Blue-Shortness and the Aging of Iron and Steel

An explanation of the "blue-shortness" and the aging of iron and steel, by H. Fettweis, in *Stahl und Eisen*, is based on the following theory, according to the London *Ironmonger*:

By working the material at temperatures below 500 deg. C. a transformation is set up, which may be termed aging. This aging, which tends to intensify the effect of cold working, requires months and years to develop at ordinary temperatures, but takes place more quickly with rise in temperature, so that it may even develop in fractions of a second and so cause the phenomena of blue-shortness. From about 100 deg. C. onwards the consequences of aging are weakened by the effect of reheating or tempering the metal, which effects are more pronounced the higher the temperature. Based on this theory, it is possible to throw light on the following phenomena:

In strength tests carried out on hot material, a minimum value of the tensile strength is found at 80 deg. C., and a maximum between 200 and 300 deg. C., in the case of tensile tests carried out at ordinary speed. When the speed of test is increased, the curve showing the strength in terms of temperature is displaced in the direction of the higher temperatures. The yield-point gradually falls with increasing temperature. The resistance of iron to repeated impacts also shows a minimum value between 200 and 300 deg. C.; whereas the minimum notch-impact strength as determined by a single blow lies between 400 and 500 deg. C.

If iron is worked at temperatures below 500 deg. C., and afterward tested at room temperature when cold, a maximum and minimum respectively for all the strength properties of the material is found between 200 and 300 deg. C. The tensile strength minimum at 80 deg. C. disappears.

The same results as in the previous paragraph are attained when the material is worked cold and then heated to a higher temperature for not too long a time.

In order to bring about the above-mentioned changes which are characteristic of blue-shortness, it is not necessary to heat the iron, but it is sufficient to leave the cold-worked material lying at ordinary temperature for some time to allow it to age.

If completely aged iron is reheated to different temperatures, it is found, when the material is afterward tested, that all the strength properties gradually fall or rise with increase in the reheating temperature, without, however, showing a maximum or minimum value.

The paper also shows how a hitherto problematic phenomenon can be elucidated in the light of the views which the author advances. Finally, the importance of aging in practice is referred to.

## Steel Turnings in French Blast Furnaces

An important metallurgical development, directly due to the war, took place at a large iron works in the north of France, which the French managed to retain, although the enemy approached very near. The works normally produced both hematite pig and basic pig, using largely Spanish ore for the former and iron ore, from the Briey district, for the latter. The loss of the Briey district early in the war cut off supplies from that quarter, while shipping difficulties prevented adequate supplies from being obtained from Spain. In these circumstances, it was suggested that the works should try to utilize steel turnings, of which immense quantities were becoming available, in the production of pig iron. Difficulties were at first experienced in thus employing the material, but in the end these were overcome and the percentage of turnings used was gradually increased until, for a time, when the supply of iron ore ceased entirely, three blast furnaces were run exclusively on them with entire success.

The monthly consumption of turnings in these furnaces exceeded 25,000 tons, while the output of pig per furnace was about double what would have been produced from the normal iron ore used at the works.

### Traveling Crane Exits from Building

The problem of getting a 30-ton crane of 60 ft. span in and out of a building was solved by the engineers of the Heine Safety Boiler Co., St. Louis, as shown in the accompanying illustrations. One of the views shows the end of the boiler erecting shop with all of the doors closed; the other shows the loaded crane passing out with all of the doors open.

The wide upper door which contains seven windows, weighs 9000 lb. and is lifted by compressed air. Half of the weight of this door is counterbalanced, making



To Permit the Traveling Crane to Exit from This Building, the Wide Upper Door Containing the Windows Is Lifted by Compressed Air

the net weight for the air approximately 4500 lb. To permit the crane to pass through, the door which is 64 ft. wide must be lifted 9 ft. The two small swinging doors, visible beneath the left-hand girder and through which the cage for the crane man passes, swing open simultaneously with the lifting of the wide door. The design for these doors, which are also air operated, was worked out by Lichter & Jens, consulting engineers, and the installation was supervised by Heine engineers.

The two central swinging doors are each 27 ft. high and 8 ft. 6 in. wide, giving a total width of 17 ft., and are operated from the inside by a hand crank. The crank is at the end of a shaft which passes through the brick wall at a convenient height for hand operation. On the outer end of this shaft is a pinion which en-

gages a bevel gear. A vertical shaft about 9 ft. long connects the bevel gear with a spur gear, which engages a 90 deg. segmental rack. The dimensions and design are such that the doors swing open with very little exertion on the part of the operator, who does this while the air lifts the wide upper door. The swinging doors weigh about 2000 lb. each, are made of steel throughout, and are operated separately. The frame work is steel. A smaller door is fitted into one of the large doors, but is invisible in the illustrations. This small door is for the use of workmen in passing in and out when the large doors are not needed.

### Cast and Forged High Speed Steel Tools

WASHINGTON, Dec. 16.—The machine-tool industry has a particular interest in the studies which are being made by the Bureau of Standards into the constitution and properties of high-speed steels as well as to develop a simpler method of determining the relative cutting value of two steels. The methods now in use or contemplated, says the report of the bureau, "include thermal analysis, whereby heating curves are taken on previously quenched samples, and hardness tests made after hardening and tempering at various temperatures. Cooperation from the mills is expected in this work. During the past year the problem of high-speed cutting steel has been at an acute stage, due to the extreme need for high-speed steel and to the shortage in the tungsten supply. This problem has been treated at the Bureau from the points of view of the development of non-ferrous cutting alloys, the substitution of metals for tungsten, and the improvement of high-speed steel forming practice; that is, cast versus wrought tool.

The bureau has had the opportunity of carrying out tests on several types of product, including cast high-speed cutting tools which in tests have shown cutting properties equal to the best wrought tools of similar composition. The extension on a large scale of the use of cast tools will work great labor and material saving and will result in lowering the cost of working metals.

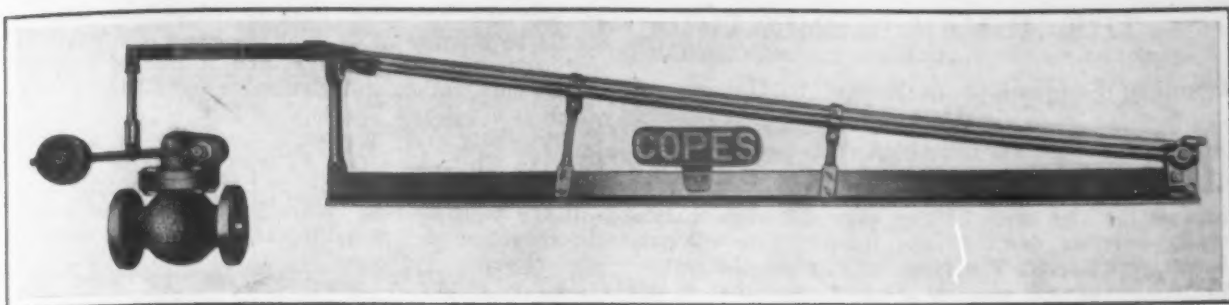
One of the special products studied has been cobalt-chrome tool steel, samples of which were submitted to elaborate tests and found inferior to the better grades of tungsten steel for high-speed tools. As a lathe tool it gave the best results when used for tools in which the cutting edge was not in continuous contact with the material being cut, as is the case with milling cutters. It cannot be said that a satisfactory substitute for tungsten in such tools has yet been found.

Besides these performance tests an investigation



The Two Central Swinging Doors Are Operated from the Inside by a Hand Crank. The two small doors through which the crane cage passes are air operated and open simultaneously with the lifting of the large upper door





The Control Valve of This Boiler Feed Regulator Has Been Redesigned, the Old Reciprocating Rod Having Been Replaced by a Horizontal Shaft, Thus to Give Greater Sensitiveness

has been in progress on the general problem of the constitution and theory of the much-discussed high-speed steel and its "red" hardness. Data on several of the physical properties and microstructure of this steel as affected by various heat treatments have been collected and seem to answer many of the questions involved.

"An investigation of the most suitable steels and treatments for the manufacture of precision gages, resulting from work originally carried on for the War Department, is also in progress at the Bureau."

#### New England Foundrymen's Association

At the meeting of the New England Foundrymen's Association held at the Exchange Club, Boston, Dec. 10, Robert E. Newcomb, president, presided. B. M. Shaw, Walker & Pratt Mfg. Co., Watertown; Thomas Scott, Brown & Sharpe Mfg. Co., Providence; and H. E. Wetherbee, James Hunter Machine Co., North Adams, were appointed a nominating committee for the selection of officers to be voted on at the annual meeting, which will be held at Boston, Jan. 14.

F. W. Stickles, Capitol Foundry, Hartford, Conn., president of the newly formed Connecticut Foundrymen's Association, gave a brief outline of the main purpose of his association and what it hoped to accomplish. He said that in 1910 the Connecticut foundry interests had a serious fight with labor unions, but that since then they fortunately had been free from such unpleasantness. Feeling that serious efforts were being made by union organizers to gain a foothold in his state, he and others felt that some measures should be taken to maintain the open shop. Mr. Stickles went on record as favoring the giving of labor a square deal and of constantly improving working conditions; in forcing foreign laborers to become American citizens; in teaching labor to appreciate the position of the employer; in individual contracts and in other things that will bring greater production and greater remuneration and greater happiness to the working class.

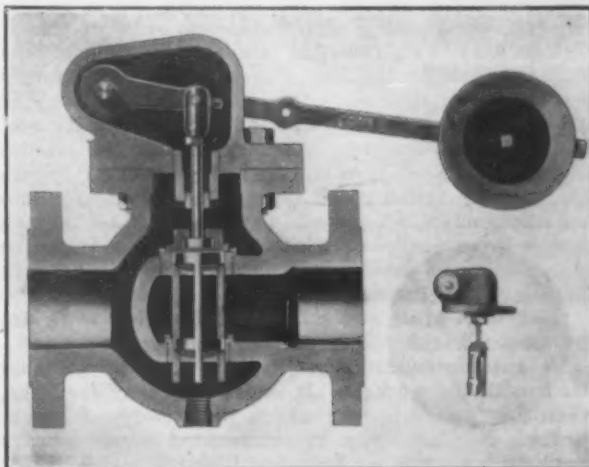
Frank B. Gilbreth, Providence, R. I., consulting engineer, then addressed the meeting, his subject being, "What Industry Must Do To Allay Unrest; How It Must Be Done," using as the basis of remedy his 16 elements in the cycle of motion. He started his address by informing the members present that they did not know their own business. He said that the fact that no two foundrymen could get together and agree, to his mind, proved that he was right in saying they did not know their business. "If no two can agree, you can't be all right, and therefore you don't know your business." He then went on to show, with the help of illustrations thrown on a screen, that up to the present generation the world in its various eras of construction failed to leave behind a record of method. The only records left to us, he said, were those concerning results.

From that point he explained his idea of the general scheme of production, motions, element of time, direction, etc., always referring back to the fact that in practice the foundrymen did not know their business. Mr. Gilbreth impressed upon those present that he was dealing in theory as to the elements of the cycle of motion as applied to the foundry business, and his effort was to prove that if his theories were applied to foundry workings the workman would be happier, his pay envelope fatter and his production greater.

#### New Regulator for Boiler Feed

A new control valve for use with the Copes boiler feed regulator has been placed on the market by the Northern Equipment Co., Erie, Pa. In this new design the reciprocating stuffing boxes have been abandoned and a horizontal shaft which rotates very slightly performs the same function as the old reciprocating rod, thus to give greater sensitiveness. The manufacturer states that the frictional resistance has been reduced as much as 6 to 16 lb., so that it is now practically negligible because the shaft rotates very slightly and the same part of the shaft is always in the stuffing box.

The valve is of the balanced piston type. The weight on the valve lever exerts a constant closing force



The Valve Cap or Bonnet Can Be Unbolted and Removed with Fittings Attached Without Removing the Valve Body from the Pipe Line

of 50 lb. on the valve piston at all times. A weight is used here rather than a spring because gravity does not vary, whereas springs are likely to grow weak with age, corrode, stick, break, etc. The valve cap or bonnet can be unbolted and removed with fittings attached without removing the valve body from the pipe line.

The assembled regulator consists principally of a long expansion tube, known as the thermostat. This is a straight piece of heavy metallic tubing, 1 1/4 in. in outside diameter. The top of the thermostat is connected with the steam space of the boiler and the bottom with the water space. Hence there is a water level in the thermostat corresponding with the water level in the boiler. It is this water level in the thermostat that determines the rate of feed. The lengthening and shortening of the tube caused by its change of temperature as the water rises and falls is amplified by the link work which operates the control valve. Thus, it is explained, the water is fed proportionately to and variably with the load, so that a variable water level temporarily inversely proportional to the load is obtained. It is pointed out that this gives a temporarily decreased feed on sudden increase in load and a temporarily increased feed on sudden decrease in load.

## THE HUMAN ELEMENT

### Practical Suggestions in Regard to Getting on with Workingmen

BY J. J. SIEFEN\*

A good many remedies have been advanced lately to meet the high cost of living when the whole matter really narrows down to one thing: More efficient, larger production. The more we consider the matter the sooner we will come to the conclusion that it can be done only by more improved machinery and more efficient and educated workers. Every operation in our factories requires a worker's efficiency and it is therefore absolutely necessary that the rights of the workers should be respected and they be assured of a reasonably sure status.

Team work, through closer co-operation of management and employees is wanted. A captain or manager of a ball team cannot win games unless he perfects the team work of his men.

Fair dealing is absolutely necessary between employees and superintendent if a satisfactory and high degree of efficiency is to be attained. A superintendent must have the right attitude toward labor and give due consideration to the men's personality. Each man has his own peculiarities, therefore no system of discipline that is not flexible enough for variations from the ordinary or normal will produce the best results.

While rules must govern all employees, no feeling should exist which gives agitators a chance to alienate the workers and drive them into bad associations. Almost always a mere suggestion works better and is more cheerfully complied with than an order or rule.

Generally conditions in the factory reflect the superintendent's attitude. Foremen and sub-foremen should be practical shop men, of good habits and of strong character, with initiative and energy. Have real foremen or supervisors, not mere automatons or rubber stamps. Such men will be looked upon as leaders and can get those under them to co-operate for efficient production. Some will say it cannot be done as quickly or as easily as it looks on paper, but it can be done sometimes more rapidly than imagined. Where there is a will there is a way.

Men with pride and enthusiasm for their work are the most efficient. They get results.

A superintendent must try to keep in personal touch with the workers. It comes very easy for some, when they have been workers in the factory. In going through the factory a superintendent should always speak to as many as he can. It gives him a better chance to obtain ideas for improving operations or production. Where a good many mistakes are made they can be laid to the inclination to talking about other things than shop (to use a slang expression). Such talks create good will. Never get familiar, as familiarity breeds contempt.

Sometimes industrial problems can be spoken of, such as the relation of capital and labor. This will combat the agitators, as they explain only one side of the case. They are never heard to talk about how necessary capital and labor are to each other. They need each other. Capital cannot do without labor any more than labor can arrive any place but the poorhouse without capital. Our American workers are fairly well educated and they are shrewd enough to know on which side their bread is buttered. By going about the factory as much as possible the workers become used to seeing the employer around, and keep right on working, attending to their duties without spasmodic or make-believe activity. Eliminate fault-finding trips; criticize freely; do not nag or scold, but praise as much as is consistently possible. Cheerfulness is wanted. Our factories should not resemble prisons. The very best mechanical and production ideas, systems and machines are of no value if there is no co-operation of the employees. With cheerful co-operation quality and quantity increase.

Broadly speaking, most workers are honest, es-

pecially the American workers (American workers should be interpreted to mean all those who can read and write English fluently), and if treated honestly as to remuneration, will give value for value received, which is equal and just to each side.

By giving every worker a square deal and trying to make him realize that he is essential for the continued prosperity of our industries and the nation, he will try to co-operate to attain that common goal—the reduction of cost by increased and more efficient production.

When paying a reasonable sum for work performed good workmanship can be insisted upon and, as a rule, will be given when proper instruction to do good work has been given. If workers are shown the best method or educated in trade schools to perform certain work or operations, are properly paid, and are given a decent chance to make good, the labor turn over is relatively small.

When a change is made from day work to premium or piece work, it should be done carefully and in a diplomatic way. Sometimes it would be better to do so gradually, by departments or groups. Induce the men to try it and be convinced in their own mind that it will benefit them financially. Increased production will be inevitable. The usual practice of continually cutting rates, especially if some fast workers earn more than is looked upon as sufficient, should be detested and avoided. Assure them of a fair and just rate for at least a year, unless conditions should warrant an increase or an improvement in the tools, or operations should necessitate a decrease in the rate.

To gain the time to be devoted to the human element in the factory, a superintendent must leave all office routine and details to an assistant, acting only in an advisory and supervisory capacity.

When workers are treated fairly present-day agitators will not be able to gather them into their net.

Private ownership of our industries has proved to be the most economical method of operation. Nationalization of industry and the closed shop will not bring the millennium. Collective bargaining by employees of a factory, without outside influence, can be encouraged, but the best workers like to do their bargaining individually, as good service will be promoted, for our national industrial record shows that there is always room at the top in our industries. Mutual interest is the foundation and prosperity of our industries. The solution of the present high cost of living is more economical and larger production.

### Deep Drawn Stamping of Chrome-Vanadium Steel

The stamping of a chrome-vanadium alloy steel running 0.60 in carbon has been accomplished on a commercial basis by the Alloy Parts Mfg. Co., Canton, Ohio, through the use of a process evolved by the National Pressed Steel Co., Massillon, Ohio, during the war. Cup races and cones for standard ball bearings, spring shackle bolts, piston pins and other products are being manufactured from this material.

This alloy steel was first rolled by the National Pressed Steel Co. for use as light armor plate during the war. The appearance of German soldiers on the western front wearing body shields three years ago brought out the first demand for a plate remarkably strong and yet light, and it was with a view to equipping allied soldiers with similar shields that alloy steel manufacturers were called upon by the War Department to produce something at least the equal of the German product.

Many samples of plates were submitted and from among these the plates of the National Pressed Steel Co. were adopted. In ballistic tests conducted by the War Department five shots of copper-jacketed bullets were driven into a 5 in. circle of a 0.109375-in. plate from a Springfield rifle at 50 yards. Under the rules of the test, the shots could crack the plate but must not crack it sufficiently to pass water. This special alloy, it is stated, withstood six shots in a 2½ in. circle without cracking. It was later found that American soldiers would not wear body shields and the alloy plate

\*Superintendent Lux Clock Mfg. Co., Waterbury, Conn.



was ordered by the War Department for use as armor for tanks.

The manufacturer states that drawn shackle bolt tubes with a thickness of 0.140625 in. have given a factor of safety of 15 to 1 in use on 5-ton trucks displacing a solid low carbon bolt 1 in. in thickness; also that the steel, heat treated, registers a mark of 700 Brinell with the extra advantage over case-hardened

material of being of the same texture all the way through. Bearing cups and cones manufactured out of this steel have undergone laboratory tests said to be equivalent to 300,000 road miles without showing wear.

Since the signing of the armistice, the National Pressed Steel Co. has been furnishing this alloy steel exclusively to the Alloy Parts Mfg. Co. for automotive parts.

## Differential Crystallization in a Cast-Steel Runner\*

Striking Difference in Structure and Composition of Metal in the Same Small Section

BY FRANCIS B. FOLEY

ON examining steel under the microscope, one is constantly confronted with structures that are difficult to interpret. Recently, in a collection of samples for exhibition purposes, the writer found a piece of open-hearth runner metal, 2 in. (50 mm.) in diameter, that had been fractured for use as a sample of cast steel structure. On polishing and etching a section for the

in. (1.6 mm.) from the skin of the runner, normal ingot structure was found (Fig. 2); this was followed by a zone, about 0.215 in. (5.5 mm.) wide, of considerably lower carbon content in which occurred a most pronounced Widmannstätten structure (Fig. 3); from this point on to the center of the runner, the metal was again of normal ingot structure (Fig. 4).

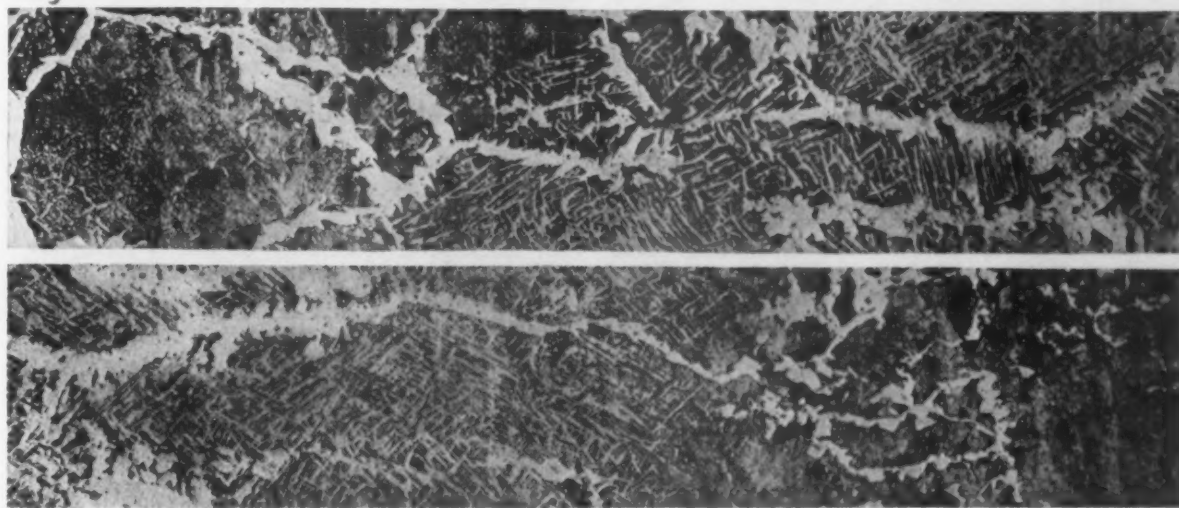
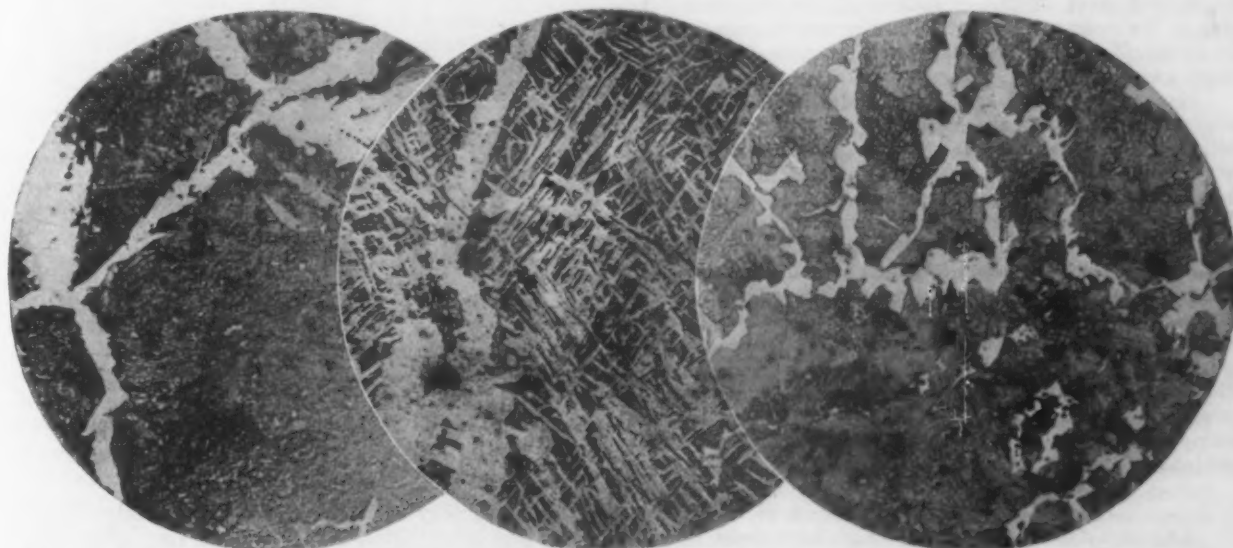


Fig. 1.—Photomicrograph Showing Range of Structure from Outside Toward Center of the Runner. Magnification is 33.5 dia., etched in picric acid.



Photomicrographs, Fig. 2, 3, 4 (Left to Right), Showing Structure at Various Points from the Outside to the Center of the Runner

purpose of photographing a field to typify the microstructure of steel in the "as cast" condition, a variety of structures was found (Fig. 1) so arranged as to arouse interest at once. For a distance of about 0.065

\*From a paper presented at the September meeting in Chicago of the American Institute of Mining and Metallurgical Engineers. The author is metallurgist, U. S. Bureau of Mines.

Representative samples taken from the metal in the three zones showed the following analysis:

	Carbon	Nickel	Chromium
Metal from skin.....	0.34	1.26	0.63
Widmannstätten zone.	0.21	1.15	0.63
Metal from center.....	0.34	1.32	0.67

Such a condition might result from decarburization followed by recarburization of the skin. This section

came from one of the branch runners to the bottom of the mold, not from the main runner, and it is difficult to conceive of decarburization occurring in this portion of a runner. If the metal were stripped while quite hot, some oxidation would take place but the recarburization is unaccounted for. It could not occur by segregation after solidification—the tendency then is for diffusion and homogeneity. The following seems to fit the conditions and is offered as an explanation.

The outside layer of normal structure 0.065 in. (1.6 mm.) thick was chilled on the walls of the runner brick when the molten metal first entered the runner. As the molten metal flows by, the outside of the stream is cooled by the walls of the runner and crystallization starts; the crystals so formed become attached to the chilled metal on the wall of the runner and, being the first to form, are necessarily of the lowest carbon concentration. When the wall of the runner has reached a certain temperature, the outside of the flowing stream of metal comes to a fairly constant temperature; but as that temperature is just under the liquidus, solid metal of low carbon content is constantly separating out and crystallizing on the walls of the runner. These crystals build outward into the stream. When the difference in temperature between the solid metal attached to the walls of the runner and the molten stream has become so small that no chilling effect is exerted, the

formation of these low-carbon crystals ceases, or perhaps they grow until such a length that they are no longer strong enough to withstand the force of the flowing metal. After the mold has been filled and the metal comes to a state of rest, solidification proceeds normally and the structure of the interior of the runner is the result. In subsequent cooling in the solid state some diffusion takes place, but evidently it does not become complete. This diffusion is first materially retarded when the metal of lowest carbon content passes through its  $A_1$  point and is stopped completely at  $A_1$ .

The very marked Widmannstätten structure in the low-carbon band might have been produced in either of two ways or by a combination of the two. One possibility is that it is due to the fact that the metal, where this type of structure is so pronounced, existed in the solid state at a higher temperature and for a longer time than the metal elsewhere. Its freezing point is higher than that of either the skin or the center metal and it did not cool as rapidly as the skin but somewhat faster than the center. The other possibility is that this type of structure formed more readily in the particular part of the runner than elsewhere because of the difference in the processes of crystallization and that the ferrite needles are actually in the same position which the original low-carbon crystals occupied during their formation and growth.

## The Acid Hearth, the Slag and the Steel

Composition of the Various Hearths and Slags—  
Relation of Molten Slag to the Metal—Role of Lime

A RECORD of observations and experiences made upon the acid open-hearth process during the last few years was embodied in a comprehensive paper, "The Acid Hearth and Slag," presented by J. H. Whiteley and A. F. Hallimond before the spring meeting of the Iron and Steel Institute in London last May.

The first part consists chiefly of a description of the structure of slowly cooled acid slags and of the stability relations of the minerals formed in them. This was a necessary preliminary to the study of the structure of the hearth itself, which forms the subject of Part II. Part III deals with the reactions which occur in the molten slag and is for the most part independent of the earlier portion. The view is advanced that an important part of the oxidation of the metalloids is due to the reduction of ferric oxide, which is continually being formed in the slag by the action of the furnace gases.

Most of the acid open-hearth slags described consisted principally of the oxides of iron, manganese and silicon. Samples were taken from slag-balls of from six to eight tons, in order to insure that they had not been modified by too rapid cooling and that proper time had been given for crystallization.

The authors submitted a series of extremely beautiful micro-sections of slags in which certain minerals appear, while in an accompanying table are given their chemical analyses. This is supplemented by graphic representations of the ternary system of the iron, manganese and silicon oxides, and the binary system of the iron and silicon oxides. Some notes follow on the presence of lime in the slags, on the effect of reheating samples of slags in a closed vessel, and on the modifications of structure by quick cooling.

### The Acid Hearth

Although the acid hearths which have been examined during the course of the present investigation were originally made of silica stone and sands containing over 96 per cent of silica, yet the analyses of these hearths taken after they had been in use for considerable periods, invariably showed a much lower silica content, and micro-sections through different parts revealed the presence of large quantities of slag. The analyses of pieces from various positions in three old hearths are given in the accompanying table.

No. 1 was taken a few inches beneath the surface at a point about 2 ft. below the wash. No. 2 was taken

near the limit of penetration of slag in the bricks beneath the crushed ganister used in making the lower part of the hearth. No. 3 was taken just above the top layer of bricks.

The above analyses may be regarded as representative of the composition of acid hearths which have been in use for some weeks and where lime has not been added in any great quantity to the slags.

For the making or fettling of the hearth the melter always asks for sand of a high degree of purity, though the impurities already present in the hearth are considerable. No doubt a combination of properties is

	Analyses of Slags		
	Hearth No. 1, Per Cent	Hearth No. 2, Per Cent	Hearth No. 3, Per Cent
SiO <sub>2</sub> .....	67.00	67.20	68.10
Fe <sub>2</sub> O <sub>3</sub> .....	7.70	0.30	0.90
FeO .....	22.90	19.80	23.10
MnO .....	1.10	6.60	3.90
Al <sub>2</sub> O <sub>3</sub> .....	0.28	2.80	2.10
CaO .....	0.50	2.20	1.10
MgO .....	0.05	0.04	0.15
TiO <sub>2</sub> .....	0.03	1.20	....
	99.56	100.14	93.35

essential in a silica sand to be used for fettling comprising, on the physical side, the grain size, grading, angularity and the angle of rest, but it would be impossible to define these in specification. A striking illustration of the importance of pure sand for fettling was furnished by a case where the sand for fettling contained about 5 per cent of alumina in the form of kaolin and traces of other impurities. The whole patch floated up during the boil.

### The Molten Slag

The durability of the acid hearth is partly dependent on the composition of the molten slag with which the banks are in contact during the process. In regulating the condition of the slag the melter is guided by its viscosity and activity; a slag too high in silica will be thick and inactive; a slag too basic will be thin and dangerous to the banks owing to the readiness with which it will dissolve silica. The correct viscosity must be maintained by frequent additions of iron oxide. Lime, like iron oxide, thins the slag, and in using it the melter must still be guided by the viscosity of the slag.

The three principal elements to be removed from



the charge by oxidation in the acid process are silicon, manganese and carbon. Two sources alone are available from which the necessary oxygen can be obtained; they are first, the ores added in working the charge and second, the oxygen content of the gas which plays continually upon the surface of the bath, for it has already been shown that the hearth itself contains very little available oxygen. By oxidation with ore the yield is increased; with gas-oxidation it is diminished.

The physical conditions under which the process is carried out must be borne in mind. The metal is covered with a layer of slag which is continuously traversed by bubbles of CO, while the slag is constantly in contact with both the metal and the gas. The oxidation of the metal by the slag may be regarded as a purely surface reaction, except for the possibility that FeO passes into the metal from the slag and is there reduced by the carbon. The oxidation of the slag by the gas is also a surface reaction, though doubtless aided by the physical solution of the gas in the upper layer of the slag.

The general conclusions may be summed up as follows: The proportion of carbon removed by gas-oxidation between melting and tapping is at least half, and is not greatly altered by the use of lime; during the boil one-half per cent of the metal is suspended as small globules in the slag, thus greatly increasing the reacting surface; gas oxidation takes place by the formation and reduction of ferric oxide in the slag, and by direct contact of the metal and gas; the proportion between the ferrous and ferric oxides in a melt is determined by the silica content, the temperature and the nature of the gases. In acid slag under ordinary furnace conditions the maximum (in the absence of reduction by the metal) appears to be about 4 per cent; throughout the boil the content of Fe<sub>2</sub>O<sub>3</sub> remains very low, 0.3 per cent, but may increase in the finishing period up to 3 per cent. It is clear that the Fe<sub>2</sub>O<sub>3</sub> must be very rapidly destroyed by the reducing action of the metal, which slackens as the carbon content falls and so permits the increase of Fe<sub>2</sub>O<sub>3</sub> at the finish; the constancy of composition of the slag in the later stages is due to a balance between the oxidation of iron from the metal and the reduction of iron from the slag by the carbon. In an acid slag the latter reaction prob-

ably takes place mainly through the direct reduction of Fe<sub>2</sub>O<sub>3</sub>, rather than by the reduction of ferrous silicate. Of the carbon removed from the metal after melting, roughly one-half is removed by the ore, one-quarter by gas oxidation through the slag and one-quarter by direct contact between metal and gas while the effect of lime in the slag is to lower the Fe<sub>2</sub>O<sub>3</sub> content, this action being probably of great value in protecting the metal from oxidation during dead melting.

#### Discussion

E. H. Saniter agreed with the author that a fairly high percentage of silica was necessary in the sand used in the open-hearth furnace. Before the war we were too insistent on refractory sand. It was so refractory that it was difficult to flux it properly but since the war the sands which had been used gave very much better results than did the Belgian sands previously employed. Another point was the use of limestone and its retarding effect on the formation of magnetic oxide in the slag at the end of the operation. It did not seem to be generally appreciated that it was the limestone which had this effect.

Dr. F. Rogers, speaking with regard to the action of lime in minimizing the amount of oxide in the slag toward the end of the operation, said that the amount of iron oxide in metal, which was what he cared most about, was definitely related to the slag in any given process at a certain temperature; the higher the temperature the lower the iron oxide concentration became.

Dr. Stead said the relation between slag and steel required careful study. A notable thing brought out by the paper was the amount of iron oxide in the sand bottoms of the furnace. One would have thought that such a material would burn down very easily, but it is a fact that it stood up and did not give way. The same thing occurred in ganister bricks. The lime, with some oxide of iron, caught from the floating dust in the furnace, was absorbed in the brick, owing to its porous character. It ascended by capillary attraction at a considerable distance away from the point at which it entered, with the result that there was less lime in the nose of a ganister brick than there was in the remainder of the brick, the lime having run upward, leaving silica and a considerable quantity of iron.

### Foreign Railroad Developments

An enumeration of new railroad projects in the more primitive countries as well of railroads to replace war destruction is contained in a pamphlet issued by the Guaranty Trust Co. of New York, entitled, "New Railways in Foreign Countries."

The program in Africa calls for expenditures of \$800,000,000 for 18,000 miles of track with 15 years to complete. Other hundreds of millions will be expended in Poland, Rumania and Russia to reconstruct those destroyed in the war. Three new international lines include the Cape to Cairo, the Paris to Constantinople, and the Paris to Bucharest.

In Argentina the Central Argentine, the Southern and the Buenos Aires Pacific require the largest amounts of rolling stock and all have extensive shops for repairing and manufacturing. In Australia an important group of five lines is receiving first development consideration as it will make available 1305 farms for soldiers. In Brazil the plans are being revived for the co-ordination of all the railroads into one system, which will thoroughly penetrate the rich coffee and cattle districts.

Belgian-French interests have contracted with the Chinese government for the construction of two railroads: One, the Lunghai railroad, from Lanchowfu to the sea, about 1100 miles, which may be a section of an east and west transcontinental railroad to Europe via Russia and Mesopotamia, tapping Central Asia which is equal in area to the United States; the second, the Tung-Cheng railroad, from Tatungfu to Chengtu, 1000 miles, a local rather than a trunk project.

At the end of 1914 the railroad system of Germany totaled about 38,380 miles and during the war new construction was only along strategic lines. Railroad pro-

jects in Greece call for 607 miles of track. The Italian Government is spending more than \$300,000,000 in the organization of its railroads, new tracks being laid everywhere needed. Gun and ammunition factories are now making railroad supplies. Japan proposes to complete within the year sixteen sections, totaling 13½ miles, which will especially stimulate mining, lumbering and agricultural industries.

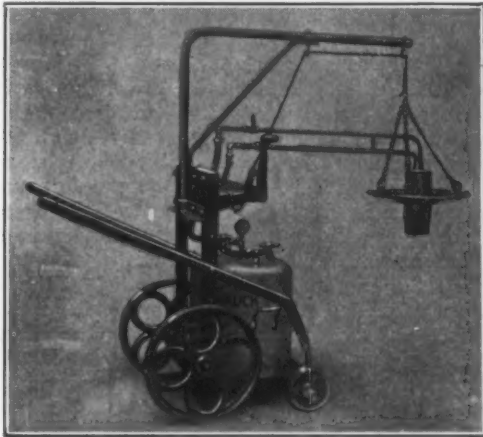
Several undertakings are being considered in Mexico for making more accessible timber, oil and ores. The securing of sufficient coal is the chief difficulty in the operation of railroads in the Near East, which were under Turkish control during the war. In spite of coal shortage new lines are contemplated. The Peruvian Government is considering a road to reach the navigable rivers to the north, running from Lima to the Cerro de Pasco copper mines, which will tap extensive virgin forests. Six hundred locomotives must be purchased by Rumania shortly, the Germans having taken all of their 2000 but 15.

In Russia the percentage of damaged locomotives is growing rapidly and the supply of skilled labor for repair work is decreasing. Early in 1917 the length of Russian railroads was 42,000 miles, but by October, 1918, there were only 15,000 miles in operation.

The annual dinner of the Cumberland plant of the N. & G. Taylor Co., Philadelphia, was held on the evening of Nov. 22 at the Port Cumberland Hotel. A number of entertainment features were introduced and addresses were made by L. Leslie Helmer, general manager; John Read, superintendent of tin house; Dan Williams, superintendent of open hearth department; E. W. Shinn, chief engineer; Isaac Berman, metallurgist; and Hollinshead N. Taylor, president.

### Apparatus for Drying Bull Ladles

An apparatus for drying out the linings of large crane and bull ladles is being manufactured by the Hauck Mfg. Co., Brooklyn, N. Y. This apparatus consists of a 20-gal. steel oil tank, equipped with 150-lb. pressure gage, oil and air regulating valves, one length of special oil resisting hose and one length of high pressure air hose, one burner with long handle and deflecting plate. The tank is mounted on an angle-iron truck equipped with two 18-in. wheels and two small wheels.



Portable Apparatus for Drying the Linings of Large Bull Ladles

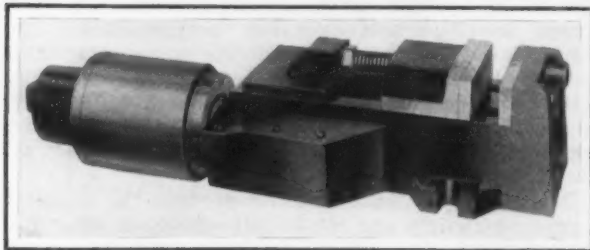
Attached to the truck is a swinging davit, from which the burner with the deflecting plate is suspended. The deflecting plate may be lowered or raised, as desired, by a steel cable which is connected to a small winding crank on the truck.

The burner operates with compressed air at 20 to 100 lb. pressure and burns fuel, crude or kerosene oil. The flame of the burner is directed down towards the bottom of the ladle, and is said to spread evenly and quickly and to heat the sides and bottom of the ladle white hot, if necessary.

The manufacturer states that this apparatus will thoroughly heat and dry the lining of a 50-ton ladle in 15 min., depending upon the heat required.

### Air-Operated Milling Machine Vise

A vise so designed that it can be operated by air or used as an ordinary hand-operated vise is announced by the American Pneumatic Chuck Co., 9 South Clinton Street, Chicago. It is standard in width, depth and opening of the jaws, in comparison with the regular hand-operated milling machine vises now on the market. It is made so that it may be placed either crosswise or lengthwise on the table of the machine. No part ex-



Milling Machine Vise Equipped with an Air Cylinder Which Gives a Gripping Power on the Work of 25,000 lb.

tends above the jaws which hold the work so that the cutters can pass over the entire vise.

It is explained that the design follows that of the modern standard milling machine vise. The jaws and screw slide are the same, and the body has the usual tongues and slots for the guides. The body is made of a steel casting and the adjusting screw slide is built into the body.

A feature emphasized is that after the piece of work

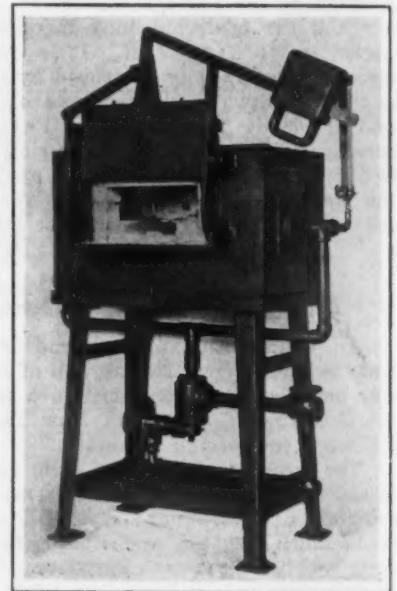
has been gripped by the jaws, the air supply may be shut off entirely, thus to effect a saving of air and to insure the work being held securely in position until the machining is completed.

The 6-in. vise is fitted with an air cylinder, 4 in. in diameter, which with 80 lb. pressure on the piston, has about 1000 lb. initial pressure. By means of an original mechanical movement which is based on the well-known toggle joint, this initial pressure is geared up to more than 30 to 1, thus to give a final gripping power on the work at the extreme point of movement of the piston of more than 25,000 lb. It is pointed out that while the vise is capable of exerting this pressure, the jaws can be so adjusted that the vise will take care of delicate work without crushing it. It has a double-acting air cylinder which opens and closes the jaws practically instantaneously, but which can be so regulated that the jaw travels very slowly toward the work. The air valve is mounted directly on the cylinder and requires only one hose connection.

The automatic action of the vise ranges from 0 to  $\frac{1}{4}$  in. Standard jaws are plain, but special jaws can be used as on the standard hand-operated vises. On special orders these vises can be arranged with a flat on one side for drill press work. The vise is made in four standard sizes, having jaws 4, 5, 6 and 7  $\frac{1}{2}$  in. in length, with corresponding heights of jaws, 1  $\frac{1}{4}$ , 1  $\frac{1}{2}$ , 1  $\frac{3}{4}$  and 2 in., and screw adjustments of 2, 3, 3  $\frac{1}{2}$  and 4 in. respectively.

### Oven Furnace Has Door of New Design

A new type of counterbalanced door is being installed on the furnaces manufactured by the Surface Combustion Co., 366 Gerard Avenue, New York. The link motion shown in the accompanying illustration is emphasized as not only allowing motion of the door up and down, but as preventing other than vertical motion. It is pointed out that the door tends to remain in either open or closed position without relying on friction.



The Counterbalanced Door on This Oven Furnace Is Equipped with a Link Motion Designed to Prevent Other Than Vertical Motion

These furnaces are designed especially for the heat treatment of carbon tool steel and high speed steel. Each furnace is equipped with a surface combustion automatic air-gas proportioner having one valve control and impact type burner which generate radiant heat in the refractory beds on each side of the hearth. The necessary air-gas mixture and therefore the desired furnace atmosphere is stated to be maintained always the same by the automatic air-gas proportioner. The one valve control is explained as making it easy to get an accurate setting.

Indianapolis business men, associated in the Greater Indianapolis Industrial Association, recently gave a dinner in the Riley room at the Claypool Hotel to the officers and executive force of the Lafayette Motors Co., which is establishing itself in the former plant of the Stentotype Co. at Mars Hill, a suburb. Earl C. Howard and D. McCall White, formerly with well-known Detroit automobile manufacturers, are vice-presidents of the new Indianapolis company. It was stated that the company has \$4,000,000 in cash.



## Tabor Company's New Plant

The Tabor Mfg. Co. is now operating in its new plant at State Road and Devereaux Street, Wissinoming Station, Philadelphia, to which it began removal immediately after the fire, Oct. 30, in its old plant at Hamilton and Eighteenth streets.

The fire which necessitated the removal several months before the time contemplated was unique in that it inflicted such heavy damage on the building, a structure used for 50 years as a machine shop, yet spared to a great degree the manufacturing equipment which it contained. The chief damage to the latter consisted of the destruction of belting, shafts and countershafts. The fire spread through all departments on three floors, mushrooming on each, the heavy beams supporting the flooring and the top of columns being deeply charred. The oil soaked floors, under the intense heat, appeared to exude a gas which ignited with great flashes of flame. The equipment standing on the floors was but little damaged, however, and as soon as work within the building was possible, it was removed to the new plant. The only drawings actually destroyed were those on the drawing boards. Others, even where they were contained in wooden cabinets, were only scorched on the edges. In one room the breaking of a skylight gave the flames an outlet and wooden cabinets but a few feet away were unharmed. That the entire building and its contents were not destroyed was due to the good work of the fire department of the Baldwin Locomotive Works, the plant of which abutted that of the Tabor Mfg. Co. Baldwin men were pouring several streams of water into the burning building before the city department had any at work.

The company was also fortunate in that in September last, it bought five acres on which stands the building into which it so hurriedly moved. A few years ago it purchased a site for a new plant at Nicetown, but the site was taken over by the United States Government.

The new building is 100 x 350 ft., of steel and concrete construction, to which is being added an extension 100 x 108 ft. It has a saw-tooth type roof, cement floor and with a few modifications will make an ideal plant for the company's purpose. It will contain spacious offices and much needed room generally. It is served by the Pennsylvania Railroad, being on the main line between New York and Philadelphia. In the rear is a platform for loading both trucks and railroad cars. Less than one month elapsed between the fire and the resumption of full operations at the new plant.

## Rolls-Royce Company Acquires Property in East Springfield, Mass.

Official announcement was made Dec. 12, that the Rolls-Royce Co. of America has purchased the plant and property of the Wire Wheel Co. in East Springfield, Mass., which was held by the Government on lease and used as a storehouse for machinery and other equipment. The Government lease was so worded that it could be terminated on short notice.

The plant in question was built several years ago for the Hendee Mfg. Co., maker of motor cycles, who sold it to the Wire Wheel Co. It consists of seven buildings of one story, built of brick, steel, concrete and glass, having a total floor space of approximately 160,000 sq. ft. The buildings are considered among the best of their kind in the country, and they are connected with ample spur trackage with the Athol branch of the Boston & Albany Railroad. The total property covers 10½ acres. The Rolls-Royce management feels it has an ideal plant for the manufacture of automobiles.

The announcement caused considerable surprise inasmuch as the company was reported as having bought another large tract of land in Springfield and to have let contracts on part of the work of constructing new buildings.

Machine-tool interests were interested in the official announcement that the Rolls-Royce management has bought more than half of its required equipment, which is either in storage at Cleveland or on its way to Springfield. The Government has agreed to remove all of its

equipment stored in the main building to other Springfield locations at once, and to remove the rest of its property at an early date.

Work of installing the Rolls-Royce machinery will begin as fast as the Government property is removed. So well are plans matured that the Rolls-Royce management expects to be able to begin the manufacture of cars within a few weeks. During the early operations, the company will employ between 300 and 400 machinists, but eventually will have considerably more than 1000 on the payroll, exclusive of clerical and office forces. Present plans call for the completion of about 400 chassis to sell at \$10,000 each the first year.

L. J. Belnap of Montreal is president of the American Rolls-Royce company. H. C. Beaver, Springfield, Mass., is treasurer. Mr. Beaver formerly was connected with the Stevens-Duryea Co. and later with the Allis-Chalmers Co. The other officers of the organization are: Ernest A. Claremont, vice-president; Claude Johnson, chairman and managing director. The officers are Joseph Skinner, Holyoke, Mass., and Charles E. F. Clarke, J. E. Aldred, Henry J. Fuller and Kenneth K. Mackensie constitute the board of directors. F. Henry Royce will be engineer-in-chief.

## Locomobile Company Reorganization

The Locomobile Co. of America, Bridgeport, Conn., is to be reorganized. A new corporation, to be known as the Locomobile Co., is to be formed, having 300,000 shares of common stock, no par value, and \$5,000,000 7 per cent cumulative preferred, par \$100, together with an authorized bonded debt of \$2,500,000 first and refunding mortgage 6 per cent bonds that will mature in 1935. The new company will issue 200,000 of its 300,000 common shares, and \$3,500,000 of its preferred, together with \$1,416,000 bonds, the proceeds of which will be used to acquire the assets of the present organization.

Subject to the approval of its stockholders the Mercer Motors Co. will acquire a substantial block of the new Locomobile stock and in addition will take an option on 100,000 common shares at \$35 per share, thereby making it the largest individual owner of that class of stock. Later the company intends to secure control of the Locomobile organization.

A syndicate of New York bankers have underwritten the new Locomobile securities to be sold.

## Crowfoot Gear Works, Inc., Expansion

Further evidence of the progressive policy of the Crowfoot Gear Works, Inc., Chicago, is had in its purchase of the property of the Mason Regulator Co. at Hyde Park, Boston. The original cost of this plant was something like \$200,000. The price at which the gear company acquired the property was not made public.

The property consists of about 37,000 sq. ft. of land having a large frontage on Hyde Park Ave., and a plant containing approximately 50,000 sq. ft. of floor space. The plant is of first-class construction and equipped with every modern appliance necessary for a factory of its kind. Further improvements will be made, however. The new owners hope to have the plant operating during the early part of next year. Employment will be given several hundred men.

With money derived from the sale of this property the Mason Regulator Co. plans to build a large addition to its plant at Dorchester to provide for its increasing business.

The Carpenter Steel Co., Reading, Pa., has arranged for a blanket life insurance policy to cover the lives of about 1,800 employees. The policy covers death from accident or sickness, permanent disability before the age of 60 years, and other features of customary practice. No physical examination is required. The premiums will be paid by the company. The minimum amount is \$1,000, increasing by \$100 for every year in the service of the company until a maximum of \$2,000 is reached.

### Nickel Alloy Welding and Cutting Torch Tips

The K-G Welding & Cutting Co., 556 West Thirty-fourth Street, New York, manufacturer of oxy-acetylene welding and cutting apparatus, will put on the market Jan. 1 a welding and cutting torch, fitted with a tip of Monel metal of an alloy of 67 to 70 per cent nickel, 25 to 27 per cent copper, less than 1 per cent iron and the remainder manganese and silicon.

The claims for this metal are that, due to its low co-efficient of expansion, high melting point and heat conductivity, it will be more acceptable for use in connection with welding and cutting apparatus than other metals heretofore developed.

The melting point, as compared with other metals, is: Monel metal, 2480 deg. Fahr.; copper, 1943 deg. Fahr.; average bronzes used for tips and welding heads, 1692 deg. Fahr. The heat conductivity is reported as approximately one-fifteenth that of copper; the co-efficient of expansion in comparison with other metals used in the manufacture of welding apparatus is as follows: Monel metal, 0.00001375; copper, 0.00001596; bronze, 0.00001774.

The K-G Welding & Cutting Co. also claims that, due to the heat conductivity being greater than that of copper, the most used metal for welding tips, these nickel alloy tips will last longer and so lower the upkeep of such equipment and that the condition of the welds made with their use will be better, due to the fact that flash-back has been eliminated. It is argued that the practice of employing one metal in the tip and another in the head causes leakage due to unequal expansion under heat and thus the flash-back. While welding in pockets, corners, etc., where intense heat is often developed, it is emphasized that the tip will withstand much more heat, operating successfully even while white hot, thereby allowing the welder to complete his work rather than cooling the torch at intervals. The weld structure otherwise deteriorates, it is stated, as it cools while the torch head and tip are returning to a normal temperature.

### National Conference of Business Paper Editors Is Organized

A meeting of editors of many leading business papers of the country was held at the Hotel Astor, New York, Nov. 13 for the purpose of forming an organization of editors of business papers. Samuel O. Dunn, editor of *Railway Age*, Chicago, was elected chairman, and Charles J. Stark, editor of the *Iron Trade Review*, Cleveland, was made secretary. The National Conference of Business Paper Editors was the name selected for the new organization and the following permanent officers were elected: President, A. I. Findley, editor *THE IRON AGE*, New York; vice-president, Clay C. Coope, editor *Mill Supplies*, Chicago; secretary-treasurer, R. Dawson, managing editor *Coal Age*, New York. The executive committee will consist of two New York men: Julian Chase, *Class Journal Co.*; B. O. Hough, *American Exporter*; two Chicago men, A. McQuilkin, *National Builder*; E. T. Howson, *Railway Age*, and two committeemen at large, Charles J. Stark, *Iron Trade Review*, Cleveland, and Harvey Whipple, *Concrete*, Detroit. A dinner was held at the Astor in the evening.

### Advanced Training School for Executives

A solution of the problem of the ever increasing cost of production, reducing waste and securing a closer co-ordination of functions between the various departments, has been sought by the Packard Motor Car Co. through an advanced training school for executives. Since April, 1918, a special course in industrial management has been taken by over 700 Packard executives, including job setters, production foremen, assistant foremen and assistant superintendents. The school was divided into assemblies of approximately 30 members each. The subjects studied included shop discipline, Rowan system of paying wages, inspection and scrap, tools, time study, routine system, stock keeping, production, care of machinery, employment, safety and sanitation, and what makes an executive.

A textbook covering the school lecture course has

been published and distributed to all Packard executives. A number of copies are available for general distribution to students of industrial management and engineering.

### Sand Market Affected by the Coal Strike

At the moment there is a noticeable scarcity of sand blast offerings throughout New England, the direct result of the coal strike. A Providence foundry supply house is in position to make small deliveries of No. 2 sand, but has no 3 or 3½, and it is doubtful if any but very small lots of the last two sizes can be obtained in Boston or elsewhere.

The Hendee Mfg. Co., Springfield, Mass., makers of motor cycles, has been consuming approximately ten tons of sand blast daily for many weeks, its sand blast department being operated on day and night shifts. The company has been securing its supply of sand blast from Maryland interests at \$4 per ton, f.o.b. shipping point. The coal strike, with its accompanying shortage of cars, practically put the Maryland company out of business so far as making deliveries is concerned. The Hendee and many other companies were therefore obliged to go into the open market for sand blast.

The sand market was thoroughly canvassed, whereupon it was found that practically no blast was to be obtained at any price. Fortunately not all foundries are short of sand, some of them having enough stock on hand to carry them along until shipping conditions improve. On the other hand, the supply is not too large for comfort and any prolonged stoppage of sand blast shipments will work a hardship on the New England foundry interests.

### Lake Ore Shipments in November

Shipments of iron ore from the Lake Superior district to Dec. 1 were 47,130,733 gross tons, a falling off of 14,019,163 tons as compared with the same period of 1918 when the movement amounted to 61,149,896 tons. November shipments were 3,152,319 tons as compared with 4,279,025 tons during November, 1918. Several cargoes were shipped during December this year, the final cargo starting down the Lakes Dec. 5. Only one cargo was shipped in December, 1918. The following tables give the November and season shipments by ports, and the corresponding figures for 1918 in gross tons:

	November, 1919	November, 1918	To Dec. 1, 1919	To Dec. 1, 1918
Escanaba .....	483,046	715,822	4,936,968	6,768,133
Marquette .....	251,149	206,847	2,132,935	3,456,054
Ashland .....	527,176	631,237	5,915,383	7,565,608
Superior .....	615,903	1,004,140	10,899,693	14,068,341
Duluth .....	875,584	1,285,496	16,281,209	20,567,288
Two Harbors.....	399,461	435,483	6,424,546	8,723,472
Total .....	3,152,319	4,279,025	47,130,733	61,149,896
Decrease .....	1,126,706		14,019,163	

### New Spanish Gear Manufacturing Company

A company capitalized at \$100,000 has been formed in Spain to manufacture commercial gears. A factory is to be erected and will be equipped throughout with American machinery to be purchased by the American Machinery Syndicate, Inc., 35 West Thirty-ninth Street, New York. Officers of the new company are: Juan de La Cierva, president; Giacomino De Andreis, vice-president. On the board of directors are: L. Maestre, Mario H. Finizio and Henry S. Moos. Mr. Moos is president of the American Machinery Syndicate, Inc.

Effective Dec. 6, the largest shipbuilding crane yet constructed was placed in service at the League Island Shipyard of the Navy Department, Philadelphia. The crane was built by the McMyler-Interstate Co., Cleveland. It is of stationary pintle cantilever type, with lifting capacity of 350 gross tons; an auxiliary hoist is provided which operates on a horizontal trackway between the two main 175-ton hoist runways. The crane is operated by electric motors.



## Reorganization and Expansion of the Reading Iron Co.

The Reading Iron Co., of Reading, Pa., internationally known as a manufacturer of wrought iron pipe, is undergoing reorganization under the direction of L. E. Thomas, the newly elected president. Mr. Thomas, who succeeded F. C. Smink, was formerly vice-president and general manager of the Birdsboro Steel Foundry & Machine Co. He has had a broad and varied experience in the iron and



policies of the company. Branch offices for the district sales representatives have been established at Philadelphia, New York, Pittsburgh, Chicago, Cincinnati, and Dallas, Texas. Additional branches now being located will be opened by the company in the future.

The Reading Iron Co. is entirely self-contained from the blast furnaces to the shipping platform. Five hundred and fifty-two different sizes and kinds of tubular products, ranging in size from  $\frac{1}{4}$  to 20 in., are being regularly produced. The pipe and tube mills of the company are equipped with five lap weld furnaces,



W. WOODWARD WILLIAMS,  
General Manager



W. E. DUNHAM,  
Production Engineer



EDGAR F. BLESSING,  
Metallurgical Engineer



CRAIG GEDDES,  
Advertising Manager

PRESIDENT LEON E. THOMAS

OFFICERS OF THE READING IRON CO., RECENTLY REORGANIZED

steel business, having held several important operating positions in the Ohio works of the Carnegie Steel Co. and later, while identified with the United Engineering & Foundry Co., installed equipment in steel plants throughout the country. For 14 years he was vice-president and general manager of the Birdsboro company.

W. Woodward Williams, general manager of the company, was for several years general manager of the A. M. Byers Co., Pittsburgh. In that position and as general sales manager, he formulated the progressive sales and advertising policy which was signally effective in stimulating and extending the market for iron pipe. Mr. Williams succeeds George Schuhmann, who retired on Aug. 1 because of ill health.

Craig Geddis, advertising manager, was formerly connected with the sales and publicity departments of the National Tube Co. and later publicity manager for the Mesta Machine Co. Important additions to the production departments of the organization include the appointment of Edgar F. Blessing as metallurgical engineer and W. E. Dunham as production engineer. Mr. Blessing was formerly connected with the Doehler Die Casting Co., Brooklyn, N. Y., and Mr. Dunham was, until very recently, service manager for the A. M. Byers Co.

Among the many new developments which have followed the reorganization of the Reading Iron Co. is the purchase of the George B. Lessig Co.'s plant at Pottstown, Pa. By the acquisition of the Lessig plant the Reading company secures an additional monthly muck bar capacity of 2600 tons, and, incidentally, claims to have become the largest manufacturer of cut nails in the United States. The Lessig nail factory has been renovated and the equipment improved throughout. It was put in operation Nov. 6. The Reading company has also purchased from the Empire Steel & Iron Co. 10 acres of land adjoining its tube works for use in future extensions.

Important changes have been made in the sales

three butt weld furnaces, together with the necessary auxiliary departments, socket shop, galvanizing department, tar dipping department, jobbing department, nipple department, etc. The skelp for the lap-weld pipe mills is furnished by two universal mills also located in Reading. These mills manufacture skelp down to 9% in. in width. For the manufacture of skelp in smaller sizes the Reading company operates six grooved skelp mills in or near the city of Reading.

Muck bar made of all pig iron is supplied to the skelp mills by six puddling plants located in and about Reading. With the present muck bar and skelp capacity, the pipe mills of the company are capable of producing 200,000 tons a year and are at present operating above this rate of production.

In addition the company owns and operates the Scott Foundry, Reading, in which are produced various classes of machinery especially sugar mills; also a forge shop, chief product of which is heavy marine forgings. The company also owns and operates 7574 acres of coal lands in Somerset county which is known as the Somerset coal department.

### Alloy Steel Plant to Be Built near Sarnia, Ont.

DETROIT, Dec. 16.—The Lake Huron Steel Corporation which expended \$100,000 on a site at Goderich, Ont., expecting to locate mills there, has changed its plans and will build near Sarnia across the St. Clair River from Maryville, Mich., where the Wills Lee automobile plant will be located. The Huron Steel Corporation has 1147 acres and expects to have mills in operation in March, the first year's output to be 100,000 tons of alloy steel. Stewart A. Howard, one of the organizers, will open offices in Detroit.

A revised edition of the chart, "Lubrication of the Motor Car," by Victor W. Page, has been published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York.

ESTABLISHED 1855

# THE IRON AGE

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## Short Hours and High Production

We have heard much in the past few years about the decrease in production which has accompanied the successive increases in wages and the progressive shortening of hours. But we have heard of few instances where the employers have taken their men into their confidence and explained to them exactly what shorter hours and higher wages meant to both employer and worker. In two instances recently brought to our attention such explanations were made with gratifying results.

The cases are quite similar. The shops in question are large, one employing a few less than 1000 men, the other somewhat more than 1000. Both are in the metal working industry. Both are open shops, but in one nearly 90 per cent of the men belong to the union, while in the other less than 10 per cent are union men. Both shops operated fifty-five hours per week. In one case the men asked for the 44-hour week, together with a substantial wage increase. In the other case the directors decided on the shorter week with a corresponding increase in wages, without any request from the men.

In both cases the men were called together in a mass meeting and the situation explained to them. In substance they were told that the change in hours and wages represented on its face an increase in the cost of the product, exclusive of material, of about 30 per cent; that the business was highly competitive, and that the product could not long stand a 30 per cent increase in cost, as a corresponding advance in selling price would mean loss of orders. In time the plant might be compelled to suspend operations, cut wages or lengthen the hours. The only alternative was that the men so perform their part as to produce as much finished work in the shorter week as they previously produced in the 55-hour week. If they did this the arrangement could be made permanent.

At the end of three months the general manager of the larger plant, when questioned as to the result of the experiment, said: "The men came through in splendid shape. I am entirely safe in saying that they are now doing as much

in the eight hours as they formerly did in ten, if not more. In the other case definite figures are available. The producer-hours per unit of product since the shorter week took effect have decreased 26 per cent and are still going down.

It is proper to add that neither company put upon the men alone the solution of the problem of increased productiveness. The managers took it upon themselves to assist by every means possible to diminish wasted effort and eliminate idle time of both men and machines. The men, however, understood their purpose and co-operated rather than opposed their efforts, as is too often the case.

Misunderstandings are too frequently at the bottom of labor troubles. The moral of the above incidents is obvious for those who care to heed it.

## Old Material Statistics

One of the disappointments of the war in a statistical way was the failure to obtain accurate data in regard to iron and steel scrap. In the early war period a careful estimate of the tonnage of scrap produced and used in this country was made by the sub-committee on scrap iron and steel of the American Iron and Steel Institute. This was confirmed later to a considerable extent by direct inquiries made by the secretary of the institute, but in 1918, when the committee found it necessary to allocate scrap and endeavored to secure information as to scrap on hand, en route, percentage used, percentage produced, etc., it was hoped that accurate data on consumption could be compiled, but the figures furnished proved to be of little value. They indicated a production of steel in excess of 50,000,000 tons and made it evident that many of the consumers were so anxious to obtain an ample allocation of scrap that they over-estimated their actual requirements by about 20 per cent. The committee found it necessary to disregard the figures and rely again upon estimates, basing them on the statistics of production of ingots and pig iron and using the ordinary percentage of scrap entering into the manufacturing processes.

One interesting phase of the situation de-



veloped was that during 1918 the consumers used a larger percentage of pig iron and a smaller percentage of scrap than in normal times. This was attributed to the fact that tonnage production for the winning of the war was the paramount consideration, and as a larger production could be had from pig iron than from scrap, the factor of cost was not considered and no effort was made to save money by increasing the use of scrap. At the present time a larger percentage of scrap is being used than would be the case if there were no coal and coke difficulties.

The Tariff Commission is seeking all the information that can be had as to scrap in this country and in Europe and finds much difficulty in accomplishing all it has set out to do. Experts in the scrap business have already informed the commission that there is no way of determining production of scrap except at a prohibitive cost. In a general way, however, facts showing the importance of the scrap industry in this country will be collated and considerable information as to conditions in Europe will be available. Doubtless it will be shown that England is self supporting as to scrap; that France will be expected to have an ample supply, but that the collections on the battlefields cannot be depended upon, as much of it is of very poor quality; that Belgium has a surplus of scrap but of very poor grade and not much suitable for export; that Italy will be compelled to import scrap as soon as her manufacturing conditions and exchange will permit, and will probably obtain supplies from France, Austria and Germany. It is also probable that Italy in the future, as in the past, will import from the United States.

### No British Labor Shortage

The specter of labor shortage in Europe has not yet put in an appearance in England at least. The war losses of life have been more than counterbalanced in that country, it appears, by the stoppage of emigration for the five war years, and now the effort is to get increased manufacturing activity not merely to take care of world export markets but to absorb the surplus labor. It is estimated that there are over 300,000 more men and women looking for employment or already employed than were engaged in the industries before the war. Further demobilization of troops will necessitate the absorption, according to Sir Auckland Geddes, president of the Board of Trade, of almost another million. In the light of these facts, figures need hardly be offered to prove the reduced output per individual. The added numbers of ex-soldiers will hardly help unless elbow room can be found for them and a better productive effort is obtained with all that this means in speeding up and in lower costs and selling prices.

Judge Westenhaver of the United States court at Cleveland has a way of saying things clearly and expounding his views in vigorous English. In the recent hearing of a habeas corpus case brought in behalf of a man who had been arrested in Cleveland as a suspect merely because he had come to

the city in search of work, the arrest was pronounced by Judge Westenhaver as "a lawless and high-handed disregard for the rights of American citizens" and he ordered the police to refrain from arresting and deporting as suspects persons who entered the city to work in the steel mills. This outrageous procedure had been carried to such an extent that Mayor Davis, when a candidate for re-election a few weeks ago, openly boasted that no strikebreakers would be allowed to come to Cleveland while he was mayor. The American Steel & Wire Co. has begun proceedings to enjoin Mayor Davis from continuing his high-handed methods, and further interesting developments are expected, but Judge Westenhaver has already rendered a distinct service to the city by his vigorous declaration from the bench.

### Record Exports of Steel Plates

The exports of steel plates from the United States up to Oct. 1 were at a rate exceeding anything attained during the war. War exports of nearly all steel products were phenomenal, but the foreign demand for many of them has subsided in the past year or at best has not much more than kept pace with the war record. Steel plates are a notable exception.

The war records in steel plate exports are represented by 551,900 gross tons in 1918, while those for 1917 were 525,670 tons. These figures compare with 223,800 tons in 1913, the record before the war, and 59,500 tons in 1914. But in the first nine months of 1919 these exports were 557,900 tons, or 61,900 tons per month, which is about 16,000 tons per month, or 25 per cent more than the monthly average in 1918. These figures do not include steel sheets.

A study of the destination of American export plates also presents interesting comparisons. Japan has been by far the largest buyer and still is. The shipment of steel plates to Japan reached its climax in 1918, when 257,700 tons, or over 50 per cent of the total of 551,900 tons, went to that country. This was at the rate of 21,400 tons per month. Even now this phenomenal rate is being practically maintained, for up to Oct. 1, Japan had taken about 191,000 tons of steel plates this year, or 21,220 tons per month.

The second large purchaser of American steel plates is Canada. That country in 1916 took 116,500 tons, or 9700 tons per month, and this consumption has been gradually increased until the shipments to Canada in 1919 to Oct. 1 were 144,800 tons, or 16,000 tons per month, an increase over 1916 of nearly 75 per cent. France and Italy have also developed into heavy consumers. Up to Oct. 1, 1919, France had taken 60,000 tons, or from five to six times as much as in all of 1916. Italy's purchases make an even greater showing, having been 53,400 tons for the first nine months of 1919, as against only 6000 tons in all of 1916. Even China thus far this year has purchased twice as many steel plates as in the same period in 1917. Great Britain's purchases to Oct. 1, this year, have been nine times what they were to Oct. 1, 1917.

It was hardly to be expected that the export steel plate movement would attain such propo-

tions in the months of readjustment following the war; but the demand is explained by the world-wide destruction of shipping during the war and the effort of every country capable of building ships to fill this void as soon as possible. The statistics especially emphasize what is commonly known of the important role Japan is planning to play in the world's shipping operations.

### Rare Metals in Steel Making

A new alloy of a rare element has been added to the considerable list of such ferroalloys at the disposal of steel makers. We refer to ferrocerium. While of very recent application, its value seems already to have been established as applied to gray iron castings of various grades. Dr. Richard Moldenke, who has done pioneer work in several of the rare ferroalloys, showed some of the beneficial effects of ferrocerium upon gray iron at the fall meeting of the American Foundrymen's Association. It possesses active properties as a deoxidizer and its further use in this connection may be expected.

The application of this new alloy to steel has not yet been studied extensively but there are possibilities that are worth considering. Its low melting point is in its favor, as is the fact that it is related to some other metals that have already proved their value in steel making. It is discovered that cerium also alloys readily with nickel, copper and magnesium, so that it is possible to make alloys of it with any of these metals for introduction into the respective non-ferrous alloys, primarily for the purpose of overcoming the bad effects of oxidation, a source of considerable trouble in that industry. Its use as an alloy here also has yet to be demonstrated but the prospects are good.

A pronounced advance has been made in comparatively recent time in the use of rare elements as alloys with steel. A few years ago, in addition to the common employment of ferromanganese, ferrosilicon and less commonly ferrophosphorus, in the steel-making process, nickel, chromium and tungsten were the chief metals used in producing alloy steels. Then came vanadium and titanium and later uranium and cobalt. A place was also found for molybdenum with which new steels and alloys are now being made. Much has been claimed for zirconium and it promises to occupy a larger place as research develops.

Today steel makers and to an increasing extent foundrymen talk glibly of the use of rare elements in their practice, and the developments in this direction are the outstanding feature in recent progress in iron and steel metallurgy.

The action of the presidents of 24 unions connected with the steel industry, in voting at Washington Sunday to continue the steel strike, sounds like the last gasp of a dying cause. In fact, the country had almost forgotten the steel strike when these union agitators got together and decided to continue the fight. That the strike has caused a loss of millions of dollars to the companies and to the employees and is still responsible for some curtailment of production, no one denies, but the folly of trying longer to prevent the men from

returning to work is manifest to anyone who has really considered the situation. More and more clearly, the steel workers have been finding out, as a result of their recent investigations, especially in the Wheeling district, how basely they were deceived by the radicals who started this strike and when the truth becomes fully known the few who still cling to the hope of accomplishing something by remaining idle will be glad to return to work.

### Voted to Continue Steel Strike

WASHINGTON, Dec. 16.—Notwithstanding failure to cripple the steel industry, the strike committee refuses to concede defeat. Members of the steel strike committee, composed of the presidents of the 24 unions included in the industry, held a special meeting in Washington on Saturday and Sunday. They voted to continue the strike and there were only two dissenting votes.

Other labor leaders joined in the war council. Among them were John L. Lewis, acting president of the United Mine Workers, who led the coal strike, with the expectation that it would be of assistance to the strikers in the steel industry; Andrew Furuseth, president of the International Seamen's Union; and Frank Morrison, secretary American Federation of Labor.

John Fitzpatrick of Chicago, chairman of the steel strike committee, presided. The union leaders insisted that steel production is being kept from going above 50 per cent of normal.

### American Engineering Standards Committee

The American Engineering Standards Committee has established headquarters in New York at the Engineering Societies Building, 29 West Thirty-ninth Street, New York. A. A. Stevenson, vice-president Standard Steel Works Co., has accepted the chairmanship of the committee and G. K. Agnew, of the Bureau of Standards, is secretary.

### How to Organize for Accident Prevention

The essential elements of an organization for accident prevention and the functions of the various elements were outlined in a paper, "Safety Movement in Steel Mills," presented by C. M. Brading and F. A. Wiley of the Wisconsin Steel Co., South Chicago, at the April meeting of the Chicago Branch of the Association of Iron & Steel Electrical Engineers.

### Stacks Blown In

PITTSBURGH, Dec. 16.—No. 3 blast furnace of the Shenango Furnace Co., Sharpsville, Pa., has been blown in after being relined and repaired. All three stacks of this concern are now operating, making about 1,400 tons of iron per day.

The American Chain Co., Bridgeport, Conn., has opened district sales offices, occupying the entire fourth floor of the Bowman Building, Ross Street, Pittsburgh, in charge of W. R. Dawson, district sales manager. The new office will cover all the territory in Michigan East of Grand Rapids, all of Ohio, Western New York, all of West Virginia, Kentucky East of and including Louisville and Lexington. Mr. Dawson was for many years connected with the P. Hayden Saddlery Co., Columbus, Ohio, and later for some years with the sales department of the Standard Chain Co., until it was taken over by the American Chain Co.

The Glasgow Iron Co., Pottstown, Pa., is arranging for a resumption of operations at its Hope Mill, which has been idle for a number of years past. The plant will be used for the production of muck bars.



## War Department Sells Large Number of Machine Tools to France

WASHINGTON, Dec. 16.—The War Department has signed a contract with the French Government for the sale of \$25,000,000 worth of machine tools from the Government surplus. They are to be paid for in 10-year 5 per cent bonds of the French Republic payable at Washington in dollars. The French Government is sending 10 representatives to select the tools from the Government inventory. Although all are subject to prior sale in the United States, the prices are to be fixed according to the price fixing chart established several months ago by the department. This is similar to the Belgian contract except that the Belgians paid cash.

### Another Policy as to Sale of Machine Tools

WASHINGTON, Dec. 16.—The War Department has again changed its policy for the sale of surplus machine tools. It has abandoned the appraisal plan announced last summer, based on an elaborate system of percentages and charts, and has substituted a new one based on actual market conditions. The old plan was abandoned primarily because the time the machine had been used and the conditions under which it had been used could not always be obtained with exactness and secondarily because the charts contained no allowance for the strength of the second-hand machine tool market. The new method of appraisal is based on the actual physical condition of each machine, determined by visual inspection, the strength of the second-hand tool market, rated at a percentage, and the prevailing market price of a new machine tool of the same style and size. The weekly gross sales of machine tools now average \$125,000, says a War Department announcement, with an average recovery against the original cost of 65 per cent.

### Large Increase in Steel Corporation Orders

Unfilled orders on the books of the United States Steel Corporation, Nov. 30, were 7,128,330 tons, compared with 6,472,668 tons on Oct. 31. This is an increase of 655,662 tons against an increase for October of 188,030 tons, for September of 175,535 tons, for August of 530,442 tons, and an increase for July and June of 685,506 and 610,545 tons respectively. The unfilled orders a year ago were 8,124,663 tons, or 996,333 tons more. The table below gives the unfilled tonnage for the Steel Corporation at the close of each month beginning with January, 1916:

	1919	1918	1917	1916
January	6,684,268	9,477,853	11,474,054	7,922,767
February	6,010,787	9,288,453	11,576,697	8,568,966
March	5,430,572	9,056,404	11,711,644	9,331,001
April	4,800,685	8,741,882	12,183,083	9,829,551
May	4,282,310	8,337,623	11,886,591	9,937,798
June	4,892,855	8,918,866	11,383,287	9,640,458
July	5,578,661	8,883,801	10,844,164	9,593,592
August	6,109,103	8,759,042	10,407,049	9,660,357
September	6,284,638	8,297,905	9,833,477	9,522,584
October	6,472,668	8,353,293	9,009,675	10,015,260
November	7,128,330	8,124,663	8,897,106	11,058,542
December		7,379,152	9,381,718	11,547,286

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons; the lowest was on Dec. 31, 1910, when the total was 2,605,747 tons.

### Lake Shipments of Iron Ore

CLEVELAND, Dec. 15.—Shipments of iron ore by water from the Lake Superior district during 1919 were 47,177,395 gross tons. December shipments, with cargoes only from Escanaba and Superior, were 46,662 tons. Shipments for the season by ports were: Escanaba, 4,963,358 tons; Marquette, 2,132,935; Ashland, 5,915,383; Superior, 10,919,965; Duluth, 16,821,209; Two Harbors, 6,424,545.

Shipments of ore by water for the past four years were: 1916, 64,734,198; 1917, 62,498,901; 1918, 61,156,732; 1919, 47,177,395.

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## Workers in Stove Foundries Advanced Ten Per Cent

A conference of representatives of the Stove Founders' National Defense Association and International Iron Molders' Union, which has been in session at Atlantic City, adjourned last Saturday. The result of the conference was that piece workers were advanced about 10 per cent, day workers were granted a similar advance and the 8-hr. day was established.

## Activity of the Motorcycle Industry

The activity of the automobile industry, especially throughout the Middle West, has been attracting much attention of late. Little attention, however, has been paid the motor cycle industry by the press.

It appears that the motor cycle manufacturers are enjoying their proportion of motor driven prosperity. The Hendee Mfg. Co., Springfield, Mass., for instance, has enough business on its books to-day to practically insure capacity operations during the greater part of 1920. The amount of orders booked through its English and other foreign connections is especially heavy and gratifying. Domestic business already contracted for exceeds the expectations of the management. In addition to motor cycles, the company is beginning the manufacture of motor wheels on a large scale.

The company is about three months behind on deliveries owing to its lateness in getting started on regular line work following its war-time contracts, and to the steel and coal strikes as well as the labor and other factors. To-day it is turning out about seventy-five machines per day, or at the rate of something less than 500 per week, or on an annual basis of something like 22,500, as compared with 25,000, the normal output. Approximately 2200 hands are employed as against 2700 during the war time.

## High-Speed Steel for the Navy

The Erie Crucible Steel Co., Erie, Pa., has recently received a contract from the United States Navy for a large quantity of Erie high speed steel for the Naval Ordnance plant at Charleston, W. Va. As in the case of all Government contracts, the award was made on the basis of quality, as proven by selective tests made at the Philadelphia Navy Yard. Eighteen different makes of steel were entered. All conditions were identical, and the tests are so designed as to put the cutting qualities of the steel to the most severe trial. The material being turned was a heat-treated 0.40 to 0.50 carbon, 3½ per cent nickel steel forging. The cutting speed was about 65 ft. per minute, the cut was 3/16 in. deep, and the feed was 0.044 in. per revolution. Each tool was run until the edge was burned off.

The total of the high speed steel contracted for on the schedule in question was divided equally among the three steels giving the highest relative performance. The two other companies to share in the award with the Erie Crucible Steel Co. are the Carpenter Steel Co., Reading, Pa., and the Crucible Steel Co. of America.

## Board of Naval Architects Proposed

WASHINGTON, Dec. 9.—The continual growth of the American Merchant Marine has necessitated changes in the governmental inspection work, according to the annual report of Supervisor George Uhler, Inspector General of the Steamboat Inspection Service. His chief recommendation is the establishment of a board of naval architects to pass upon hull construction. This necessity, he points out, was particularly emphasized by the overturning of the steamer Eastland in the harbor of Chicago four years ago.

## Pickling and the Properties of Steel

WASHINGTON, Dec. 16.—The Bureau of Standards is conducting investigations into the embrittling of steel, by cleaning, pickling and plating. This study was begun originally in connection with specifications for aircraft parts to determine the harmful effects of pickling, cleaning and plating in wires, thin rods and sheets of various grades of steel submitted to several heat treatments. Experiments with the tensile test as a criterion failed to measure properly the embrittling effect produced by pickling. The impact test on notched bars was also investigated, but it was found that no constant results could be obtained. Alternating-stress tests of 0.30 per cent carbon steel show that the pickling in sulphuric acid reduces the resistance to fatigue by more than 30 per cent for rods ranging in diameter from ½ to ¾ in. Steel rods, 3/16 in. in diameter, and carbon content varying from 0.09 to 0.87 per cent, show

somewhat corresponding reductions in resistance to fatigue. Analogous results were obtained by the Erichsen test on sheet steel of various thickness and hardness. Brittleness gradually decreases at room temperature, but recovery is not complete although hastened by heating.

Brittleness caused by pickling seems to be the result of two effects combined: A temporary effect supposedly dependent on hydrogen; a permanent effect caused by roughening or etching action of the acid. The effect of plating upon material which has been cleaned, pickled or sand-blasted has also been studied.

## Wharton Steel Co. Improvements

CLEVELAND, Dec. 16.—The Wharton Steel Co., Wharton, N. J., recently acquired by J. Leonard Replogle and associates, will spend approximately \$1,500,000 in rebuilding and adding to its plant. Two of the three blast furnaces will be rebuilt, an ore yard equipped with an electric bridge will be provided and stock bins reconstructed. The engineering and construction contract has been placed with Arthur G. McKee & Co., Cleveland.

## Metal for Replacing Wood in Airplane Construction

WASHINGTON, Dec. 16.—The Bureau of Standards dropped most of its experimental work upon the use of metal to replace wood in airplane construction, but the future of metal construction appears promising, especially as the need for a fire-resisting airplane becomes more generally understood. To avoid the difficulty which has been found in designing sheet metal parts so as to secure sufficient compressive strength—as, for example, in the flange of a beam or spar—one engineer has devoted much time and study to the use of steel tubes. A single metal tube has much less strength for its weight than a beam designed to concentrate most of the material in the flanges which are subjected to the higher stresses. The tubular design uses several small cold-drawn steel tubes for the flanges which are connected by diagonal laticking of tubes of the smaller diameter. The design is very flexible in the smaller diameter. The design is very flexible in that of a single beam to meet the strength requirements. It is also possible to join tubes by inserting a snugly fitting tube of smaller diameter into another for a distance which will give satisfactory strength. Methods of fastening the two tubes together readily present themselves. It is believed that encouragement and assistance given to metal construction by this Bureau is now about to result in material improvements in the field which will come into general use.

## Reduced Freight Rates to United Kingdom

WASHINGTON, Dec. 16.—A reduction of about \$2 per ton has been made in the freight rates on various iron and steel articles from United States North Atlantic ports to United Kingdom ports by the Shipping Board. A supplemental tariff on iron and steel pipe has also been issued by the Shipping Board between United States Atlantic and Gulf ports and the East Coast of South America. These rates do not represent a reduction, but a change from the weight or measurement basis to a flat weight basis. New rates from United States North Atlantic ports for United Kingdom ports include the following, per gross ton:

Axles, bands, iron or steel, \$11; bars, billets, blooms, iron or steel, \$10; bolts and nuts, \$12; carwheels, \$11; copper ingots, pigs and bars, \$13; fastenings, rail, \$10; forgings, rough, \$10; hoops, iron or steel, \$12; iron, pig, \$10; lead, pig, \$12; nails, wire, \$11; nuts and bolts, \$12; pig iron, \$10; pig lead, \$12; pipe, cast, up to 4 in., outside measurement, \$11; pipe fittings, \$11; pipe, wrought, up to 4 in., outside measurement, \$11; plates, iron or steel, not over 30 ft., \$10; rail fastenings, \$10; rails, up to 33 ft., \$10; scrap iron, \$11; screws, \$12; shafting, unfinished, \$12; sheets, galvanized, \$11; sheets, plain, up to 30 ft., \$10; skelp, \$10; slabs, \$10; spelter, \$10; spiegeleisen, \$10; spikes, \$12; steel, cold rolled, in boxes, \$13; steel hoops, \$12; steel, tool, \$13; steel switchco, \$10; structural material, up to 30 ft. in length and 2 tons in weight, \$11; tin plate, \$12; wire, barbed, \$14; wire, galvanized, \$12; wire, plain, in coils, \$12; wire, plain steel, in barrels or cases, \$13.



# Fuel Restrictions Are Gradually Lifted

General Return of Miners to Work Enables Government to Permit More Freedom of Operations, but Many Iron and Steel Plants Are Still Hampered by Coal Shortage

WASHINGTON, Dec. 16.—With the exceptions of control over the prices, all restrictions on the production of coke have been removed by the Central Coal Distributing Committee. The restrictions curtailing the output of coke 25 per cent have been lifted, together with the rescinding of the order limiting production in steel and other industrial plants to three days a week. The Fuel Administration's maximum prices will be kept in effect temporarily while the coal shortage continues.

The Fuel Administration's order restoring the wartime maximum coke price still remains in effect, and may continue for some time. The other restrictions have been generally removed, train service having been restored throughout the country, and other limitations being taken off as rapidly as regional directors considered them advisable.

Reports to Washington indicate that the coal industry is rapidly returning to normal and the miners, generally, are showing a disposition to return to work.

One of the results of the settlement of the coal strike was the resignation of Dr. Harry A. Garfield as Fuel Administrator. Dr. Garfield was not consulted in the settlement as made by Attorney General Palmer and the President's secretary, Joseph P. Tumulty, with the authority of the President, and feels that the course followed was not justified. It is Dr. Garfield's fear that by the appointment of a commission composed of three members, one representing the operators, one the miners and one the public, that the public would always be in the minority and would be outvoted by the other two, who might combine on an increase in wages with the cost passed along to the public. Dr. Garfield has held that the public should not be required to pay anything additional for coal. The commission as proposed by him would not have had authority to fix prices, but merely to make recommendations.

Following his resignation and its acceptance by the President, Dr. Garfield appeared before the Senate subcommittee investigating the coal situation. While stating his views rather freely, he declined to produce some of the documents bearing on the situation which would have tended to accentuate the split between him and the President.

## Coke Production Increases

The weekly report of the Geological Survey shows that the production of beehive coke during the week ended Dec. 6 rose to the highest level since the cessation of the war demand, and prices of spot coke reached the highest point recorded since August, 1917, before the imposition of maximum prices by the Fuel Administration. The report states that restrictions on the conversion of coal into beehive coke, adopted by the Government for the conservation of coal, did not take effect during that week, although announced before the week closed. In apprehension of an impending scarcity, consumers of coke hastened to acquire what tonnages they could before the restrictions went into effect. The total output of beehive coke for the week ended Dec. 6 is estimated at 459,000 net tons, as against 446,000 during the week ended Nov. 29 and 543,000 for the week ended Dec. 7, 1918. Production to date in 1919 totals 18,380,000 tons, as against 28,692,000 tons during the same period in 1918.

Coal production during the week ended Dec. 6 was

43.5 per cent of normal. This was lower than at any time since the first two weeks of the strike, the figures for successive weeks, starting with the week ended Nov. 8, being 29.6, 44.5, 47.3 and 43.5.

The total output for the week, including lignite and coal coked, was 5,259,000 net tons. The average during the four weeks ended Oct. 25, which was considered normal period, was 12,089,000 tons.

## Coal Hurried to Youngstown

YOUNGSTOWN, Dec. 16.—Iron and steel plants expanded operations this week when the Pennsylvania Railroad rushed 1500 cars of run of vein coal from storage tracks in western Pennsylvania to this district. All companies maintained groups of men unloading and storing coal over Sunday.

The Trumbull Steel Co. at Warren started nine finishing mills Tuesday. The Republic Iron & Steel Co. began the week with four mills in the Brown-Bonnell finishing department and the Bessemer plant in operation. The open-hearth department and plate mill did not start because of lack of coal. The Sharon Steel Hoop Co. started eight sheet mills and a jobbing mill, its entire sheet-making equipment.

The Youngstown Sheet & Tube Co. began the week with all departments running in part and with prospects for better schedules later in the week. The Brier Hill Steel Co., which was practically flat in steel and finishing departments, commenced the week with practically all departments active. The Carnegie Steel Co. continued operations on a 100 per cent basis in the Youngstown district with one week's fuel on hand.

The Youngstown Sheet & Tube Co. this week booked an order for 10 carloads of oil well casing of different sizes for development in the Ciscoe field in eastern Texas.

## Improved Conditions at Chicago

CHICAGO, Dec. 15.—Effective at 12:01 a. m. today, Government regulations limiting non-essential industries to a three days supply of power, light and heat a week, were cancelled in the Northwestern and Central Western Railroad regions. At the same time all restrictions on the movement of bituminous coal to preferred consumers were lifted. The Fuel Administration will release coal in transit to consumers, classed as non-essential, only on approved applications. Industries in this class may also call upon retail dealers for their requirements, as the latter are no longer limited as to their deliveries by truck or wagon. In no case, however, will coal be given to a non-essential consumer who has more than one week's supply on hand. The fuel regulations, as they now stand, forebode an early resumption of normal operation by industries which have curtailed or entirely suspended operation.

Railroad officials of the Central Western Region, in which most of the bituminous mines of this territory are located, declare that the car supply will prove equal to the demands of the mines when they have fully resumed production. In a statement given out Dec. 12, the Central Western regional authorities announced that 34 of 144 shipping mines in Illinois were producing coal, 53 of the 112 Indiana mines in the region were working, and 30 of 50 Iowa mines had resumed. Subsequent press reports indicate that practically all the remaining mines will be operating early this week.

The Fuel Administration's nation-wide order of a week ago did not limit the operation of industries which supplied their own light, heat and power. It merely limited the service of public power and light plants, using bituminous coal, to three days a week. A number of non-essential industries in this district

which had sufficient coal to warrant normal operation made arrangements to supply their own light and power. The Woodstock Typewriter Co., Woodstock, Ill., connected up four farm tractors with dynamos to provide power and used a Fairbanks-Morse high-speed gas engine to generate electric light.

Railroad passenger service, which was materially curtailed a week ago, will be on a normal basis again before the end of the week. Beginning today all Chicago suburban trains which had been suspended will resume operation. Effective at 12:01 a.m., Dec. 18, all regular passenger trains which were cancelled a week ago will be restored to service in the three western railroad regions. The temporary reduction in trains in this territory is estimated at about one-third the normal service.

### Mills Still Hampered

YOUNGSTOWN, OHIO, Dec. 15.—Mahoning Valley steel mills are still largely curtailed due to coal shortage. The Trumbull Steel Co., Warren, Ohio, and Sharon Steel Hoop Co. were hardest hit, former suspending in all departments at the Trumbull works except the strip mills. At the Liberty works at Leavittsburg, Ohio, output was largely reduced, though the mill was kept operating. The entire steel plant, including seven open-hearth furnaces, blooming mill and 18 and 21-in. combination sheet bar and billet mills and tin-

plate and sheet mills were idle at Warren. The Sharon Steel Hoop Co. suspended its open-hearth plant and blooming mill at Lowellville, and its hot mills at Haselton.

Until coal stocks are materially replenished, all district producers will be compelled to operate on reduced tonnage. The Brier Hill Steel Co. managed to operate through the week and start this week with curtailed production. Though the 900 employees of the Brown-Bonnell finishing mills of the Republic Iron & Steel Co., idle since Sept. 23 because of the strike, voted to return two weeks ago, the plant has been unable to resume because of lack of coal.

No blast furnaces were banked because of the coal situation, though their production was substantially lessened. By concentrated energies, by-product coke plants were also kept supplied with fuel. The Carnegie Steel Co. has been the least affected in the district, though it, too, has been forced to curtail.

Operations resumed in part this week at the Mercer, Pa., works of the American Sheet & Tinplate Co., suspended by coal scarcity.

For the second consecutive year, the steel production record was broken for the 12-month period ending Dec. 9 at the Farrell, Pa., works of the Carnegie Steel Co.

Since it was recently relighted, blast furnace No. 3 of the Carnegie Steel Co. at Farrell, Pa., has broken daily, weekly and monthly output records.

### Jenkins Brothers Will Have Bridgeport Plant

Jenkins Brothers, New York, will, in the near future, increase their manufacturing facilities, by operating a plant in Bridgeport, Conn., to be devoted to the manufacture of the Jenkins valve—an engineering product which dates back to 1865, when Nathaniel Jenkins invented and first introduced the renewable disc type of valve. The heirs of the founder of the business continue to hold the controlling interest in the company. The present head is Farnham Yardley, a son-in-law of the late Alfred B. Jenkins. Frank T. Swain, who has been connected with Jenkins Bros. since 1879, is vice-president, and it is expected that Charles V. Barrington, who has a wide experience in the manufacture of valves, will also be elected a vice-president, and will be in charge of the Bridgeport plant.

The manufacture of the Jenkins discs, sheet packings, pump valves and other mechanical rubber goods will be continued at Elizabeth, N. J. The Canadian branch, Jenkins Bros., Ltd., Montreal, has recently completed alterations and additions to its brass valve department, and now has in course of construction a new 80-ft. by 192-ft. iron valve foundry. The Canadian branch supplies valves throughout Canada and foreign countries, while the Bridgeport plant will make valves for use in the United States and insular possessions.

### Improving Cast Iron Car Wheels

WASHINGTON, Dec. 16.—For the railroad material industry the Bureau of Standards has worked out a number of important problems. It has completed an investigation of the graphitization of white cast iron upon annealing. This problem arose in connection with other investigations of the properties and characteristics of chilled-iron car wheels and in particular the best range of annealing temperatures. This was brought to the attention of the Bureau by one of the car-wheel manufacturers. The composition is so chosen and the wheel is so cast that the tread and inside of the flange show white iron and the remainder graphitized or gray iron. In order to relieve the stresses set up during the cooling of the wheel under drastic conditions, the wheels are piled in pits while red hot and allowed to cool very slowly. Investigation developed that the highest temperature at which no graphitization of the tread and flanges takes place is about 720 deg. C., which is also the maximum annealing temperature for car wheels.

The investigation of stresses in chilled-iron car wheels caused by heat from brake action has been nearly completed, says the Bureau report. A very large percentage of car-wheel failures are attributed to stresses

caused by heating of the tread by brake action, the central part or hub of the wheel remaining relatively cool. It is the purpose of this investigation to determine and record for adoption the most suitable material and design of wheels to resist stresses of this kind. In this investigation the tread of the wheel is heated by passing an electric current through a circular resistor insulated from the tread. The wheel remains stationary, thus readily permitting the taking of the temperature and strain-gage readings. Considerable differences have been found in the behavior of wheels differing in design and weight. Several car-wheel manufacturers have co-operated with the Bureau and it is expected

### Production Increasing at Youngstown

YOUNGSTOWN, OHIO, Dec. 16.—Steel mill schedules were substantially accelerated to-day with improved coal supply. The Youngstown Sheet & Tube Co. started No. 1 blast furnace at Hubbard, banked since Sept. 24, and put four additional sheet mills in commission. The Mahoning Valley Steel Co. started its entire sheet mill plant at Niles, consisting of eight units.

"We are getting additional coal supply for the units already in operation," said General Superintendent W. C. Reilly of the Sheet & Tube Co.

### Fiat Company Buys Austrian Property

It is probable that Italy will buy considerably less steel from the United States owing to the purchase by the Fiat Motor Co., Turin, Italy, of the Alpine Montan Gesellschaft, an Austrian iron and steel-making property, consisting of mines, blast furnaces, steel-making furnaces and foundries. It is said the mines will yield profitable ore for many years.

### Iron and Steel Export and Import Statistics

Philip B. Kennedy, director of the Bureau of Foreign and Domestic Commerce, Washington, writes that the classification for the new compilation of import and export statistics which has been in progress for some time has been carried well along, but cannot be completed in time to put it into effect as they hoped next January. The final revision is being pushed forward as rapidly as possible, so that the schedule can be printed well in advance of Jan. 1, 1921, the date on which it will be put in force. The bureau invites suggestions from importers and exporters and customs brokers handling iron and steel products, and earnestly desires their hearty support in making the new compilation as nearly perfect as possible.



# Iron and Steel Markets

## FUEL RESTRICTIONS OFF

### Steel Shortage Still the Dominant Factor

#### Extensions of Metal-Working Plants a Marked Feature—Belgian Locomotive Purchases

The Government's 50 per cent restriction on coking coal came off soon after the miners' decision of Dec. 10 to return to work, and the limitations on coal for boilers and gas producers have also been removed. At the coal mines which produce metallurgical fuel resumption has been quite general and nearly normal output is looked for within a week or 10 days.

However, the distribution of coal is still subject to regulation by the Railroad Administration, and iron and steel works, many of which had drawn heavily on their coal reserves, will be hampered for some time. Fortunately, the banking of additional blast furnaces has been avoided and those now idle will start up as fast as they can accumulate enough coke.

The week has brought little change in the rate of steel works operation, but it has unmistakably increased the pressure from consumers and the problem of those producers who set out to hold prices down has been made harder.

Important consumers of steel, seeing that the supply in the first half of 1920 will fall much short of going around, are redoubling their efforts to cover. The perplexity of makers is not only that they are oversold for the first quarter and some of them for the first half, but that their fuel costs have risen and are likely to rise more and that 1920 may bring higher iron ore and higher rail freights.

To add to the tension, there has been an industrious circulation of reports by the steel strike leaders that a 15 per cent advance in wages is to be made early in 1920.

Already sales departments are mainly employed in apportioning finished steel among users according to their past consumption. Meanwhile, in spite of the policy of the Steel Corporation and a few other producers, of sticking to the March 21 prices, finished material tends to follow the rise in pig iron. Yet the amount of unsold steel that the leading sellers can offer for the first half of the new year is relatively small. Some of the orders may not be delivered for twelve months.

Illustrating the price tendency is an Eastern sale of 3000 tons of rerolling billets at \$50, Pittsburgh; an advance in shapes from 2.45c. to 2.55c., Pittsburgh, by two Eastern mills; the quotation of 3.50c., Pittsburgh (or \$5 per ton higher), on bar iron by Eastern makers; sales of plates at 2.85c. and 3c., Pittsburgh, while a Pennsylvania mill has put its price at 3.25c. for first quarter.

Plates are still a foremost feature in current business. At Chicago 70,000 tons of steel, two-thirds of it plates, has just been sold to a Pacific Coast shipyard. Another order for 27,000 tons taken at Chicago is for a Pacific yard. Business with England keeps up, and 5000 tons of plates for a shipyard there, on which 3.25c. was quoted, is pending. The Navy Department will soon take bids on 10,000 tons for League Island Navy Yard.

The Pennsylvania Railroad is buying 4000 tons of plates and shapes.

Belgium has placed 150 locomotives with two American builders and may buy 50 more. It appears probable that Germany will supply 200.

The Canadian Pacific rail order placed with the Algoma mill has been increased from 80,000 tons to 140,000 tons. On 18,000 tons for the Dutch East Indies, two-thirds went to the Steel Corporation and one-third to the Consolidated company.

Pig iron buying has fallen off, as it was bound to do with so little available for the next six months, but where iron can be had it is \$1 to \$2 above last week's prices.

New industrial construction is more and more a factor in the demand upon iron and steel works. Metal-working manufacturers are beginning a program of expansion which promises to equal the remarkable development of the automotive industries this year. A locomotive company has appropriated several million dollars for additions and new equipment, an electric company has bought one new plant and is building another.

These are but examples of the new work that is going on or being planned for in many lines. This is reflected in an increasing demand for machine tools and other equipment. Orders running into hundreds of thousands of dollars have not been infrequent, and one company is now in the market for about 200 machines.

The demand upon the machinery trade for tools for these expanding industries has been so great that the fear felt early in the year, of the resales of machine tools used in war work, has quite disappeared. And this week Washington reports the sale to France of \$25,000,000 worth of tools from the Government surplus in this country, payment being in 10-year bonds of the French Government. This purchase is in addition to the tools (of value estimated all the way from \$10,000,000 to \$40,000,000) already in Europe, which were a part of the \$1,300,000,000 worth of war material, food, supplies and equipment sold to France for \$400,000,000 six months ago.

## Pittsburgh

With the settlement of the coal strike and also with the steel strike virtually over, it is believed that labor troubles in the iron trade are probably at an end. The only strike that might tie up the iron trade would be one of the railroad employees, and it is not believed they will be foolish enough to attempt it. It is a remarkable fact that not a single important strike this year has been successful, and the opinion is general that labor unions, including those that stood well at one time in the estimation of the public, have been set back many years by lining up with agitators of the Foster and Fitzpatrick type. These men so far have refused to call off the steel strike, but an explanation is given in the fact that reliable reports are that their salaries were doubled when the strike started, and will continue at the high figure while the strike lasts.

The Government has removed all restrictions on the mining, transportation and uses of coal and coke, with the single exception that the distribution of coal is still in the hands of the Railroad Administration. Coal miners by thousands went back to work on Monday, Dec. 15, and in a week or 10 days it is likely that normal output of coal will again be reached. The

prospects are that no more blast furnaces will have to bank or blow out by reason of coal or coke shortage. The demand for pig iron, semi-finished steel and finished steel products continues very heavy with prices steadily going up. Steel mills, with business already on their books, and on which they are many weeks back in delivery, together with new business that will naturally come in, are practically sold up on all the material they can make over the first half of next year. On tubular goods, some mills are sold up for all of next year. Stocks of goods held by jobbers and consumers are very low, and deliveries by the mills are slow. There promises to be an active steel market over the first six months with prices ruling high.

**Pig Iron.**—Sales of Bessemer iron are reported to have been made in the past week at \$36 at Valley furnace for first quarter and first half, basic at \$35, No. 2 iron at \$38, with some sellers asking still higher prices. We note sales of 7000 to 10,000 tons of basic iron for first half delivery at \$35, Valley furnace, 1500 tons of Bessemer at first half for \$36 and 8000 tons or more of No. 2 foundry at \$38 Valley furnace. Some producers of pig iron now believe the market is too high, and that the brakes should be put on to prevent any further advances.

The following quotations are all per gross ton at Valley furnaces, freight rate for delivery in the Cleveland and Pittsburgh districts being \$1.40 per ton.

Basic .....	\$35.00
Bessemer .....	36.00
Gray forge .....	37.00
No. 2 foundry .....	38.00
No. 3 foundry .....	37.50
Malleable .....	37.00

**Ferroalloys.**—There have been further sales of domestic ferromanganese, 500 to 600 tons, at \$120 delivered, for first quarter delivery. A leading maker has fixed its price on 50 per cent ferrosilicon at \$85 at furnace, but is understood to be willing to meet the market. The leading consumer of 50 per cent ferrosilicon in the Pittsburgh district has covered on its needs for next year.

We quote 78 to 82 per cent domestic ferromanganese \$120 delivered, and English at \$110, with a reduction of \$1.50 to \$1.75 per unit for lower percentages. We quote resale 50 per cent ferrosilicon at \$80 to \$85 and 18 to 22 per cent spiegeleisen at \$36 to \$38, delivered. Prices on Bessemer ferrosilicon are: 9 per cent, \$56.50; 10 per cent, \$59.50; 11 per cent, \$62.50; 12 per cent, \$66.10. We quote 6 per cent silvery iron, \$43.75; 7 per cent, \$48.00; 8 per cent, \$50.00; 9 per cent, \$52.00, and 10 per cent, \$54.50. An advance of \$3.30 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on Bessemer ferrosilicon, and an advance of \$2.50 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on silvery iron. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, which have a uniform freight rate of \$2.90 per gross ton for delivery in the Pittsburgh district.

**Semi-Finished Steel.**—Very little is being done in sales of soft Bessemer or open-hearth billets or sheet bars, or in forging billets, as the mills have no steel to spare, and are very much behind in delivery. Soft Bessemer and open-hearth 4 x 4 in. billets would probably sell at \$48 to \$50, sheet bars \$50 or higher and forging billets \$60 to \$65, f.o.b. maker's mill, Pittsburgh or Youngstown.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$48; 2 x 2-in. billets at \$48 to \$50; slabs, \$47 to \$48; sheet bars, \$50, and forging billets, \$60 to \$65 base, all f.o.b. at mill Pittsburgh or Youngstown.

**Finished Material.**—The demand for all kinds of finished iron and steel is far beyond the ability of the mills to furnish, and every day consumers and jobbers are seeking new sources of supply and are being turned down. With business already on their books, and with what will naturally come from their regular trade, the steel mills are filled for the first half of next year, even without any export business. Shapes are very firm at 2.45c, sheared tank plate at 2.65c to 2.75c and steel bars 2.75c to 3c at mill. However, one leading maker of steel bars has notified its regular customers that it will take care of them for first quarter at the March 21 price of 2.35c at mill, but likely will not be able to give customers their regular quantities. Leading consumers of sheets and tin plate are being taken care of for first half by the American Sheet & Tin Plate Co. at the March 21 price of \$7 per base box for tin plate and the March 21 schedule of prices for all grades of sheets. Wire mills are sold up for months, and are far behind in deliveries. Tenders of new business are being made to the wire mills with heavy pre-

miums in prices, but these are being turned down as capacity is sold up. Cold-rolled steel bars are 3.60c minimum up to 3.75c and higher at mill. On tubular goods, mills are sold up for six to eight months and are declining to quote. The National Tube Co. is reported as practically filled on every thing it can make for all of next year.

#### Iron and Steel Bars

We quote steel bars rolled from billets at 2.75c, and from old steel rails, 3c. Pittsburgh mills rolling iron bars quote at 3.35c. Pittsburgh, plus full freight rate to point of delivery.

#### Structural Material

Beams and channels up to 15-in., 2.45c, Pittsburgh, large lots.

#### Plates

Sheared tank plates, ½-in. and heavier, at 2.65c. to 2.75c. Pittsburgh, depending on order and delivery.

#### Spikes

We quote standard spikes, 9/16 x 4½ in., at 3.35 base per 100 lb. in carload lots of 200 kegs of 200 lb. each, and small spikes, ¾ in., 7/16 in. and smaller, at \$4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, plus usual extras. Boat and barge spikes, \$4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, all f.o.b. Pittsburgh. For less than carload lots 1c. per lb. higher is asked.

#### Cold Rolled Strip Steel

We quote cold rolled steel at \$6.00 base per 100 lb. f.o.b. Pittsburgh, for 1½-in. and wider, 0.1000 in. and thicker, hard tempered in coils 0.20 carbon and under. Boxing charge, 25c. per 100 lb.

**Coke.**—The Fuel Administration has removed all restrictions made recently on the production of coal and coke and its distribution, except that the Railroad Administration still has in charge the distribution of coal. The settlement of the coal strike means that the Vestal Coal Co., owned by the Jones & Laughlin Steel Co., has again started its mines, and the latter concern will likely soon be out of the market as an active buyer of coke for its blast furnaces in Pittsburgh and at Aliquippa. This company was buying for a time nearly all the furnace coke offered, and paid, in some cases, very high prices. Government prices on coke are still in effect, these being \$6 for furnace and \$7 for foundry. The Government price of \$2.35 per net ton at mine for run of mine coal is also still in effect, and this will probably largely increase the output of coke, as furnace coke at \$6 per net ton at oven is much more profitable to make and sell than coal at \$2.35 per net ton at mine. A shortage in supply of cars is expected owing to the fact that thousands of cars loaded with coal and coke are standing on sidings everywhere and until these are moved to destination, unloaded and returned for service in the coal and coke regions, there is likely to be a shortage of cars. Several operators say they are already feeling it.

**Old Material.**—There has been some heavy buying of certain grades of scrap in the past week and prices have again advanced from \$1 to \$2 a ton. Two local consumers have recently bought heavily of steel melting scrap at as high as \$25 delivered, and it is claimed \$25.50 has been paid. Low phosphorus melting scrap is very scarce, and has sold in small lots at \$28 and \$29 delivered. We note sales of fully 10,000 tons or more of heavy steel scrap at \$24.50 to \$25 delivered and 200 tons of low phosphorus billet and bloom ends at about \$29 delivered.

Heavy steel, melting, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered .....	\$25.00 to \$25.50
No. 1 cast for steel plants .....	30.00 to 31.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa., and Pittsburgh .....	31.00 to 32.00
Compressed steel .....	21.00 to 22.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh district .....	18.00 to 19.00
Bundled steel stamping .....	16.50 to 17.00
No. 1 busheling .....	24.00 to 25.00
Railroad grate bars .....	21.50 to 22.00
Low phosphorus melting stock (bloom and billet ends, heavy plates) ½ in. and heavier .....	29.00 to 30.00
Railroad malleable .....	24.00 to 25.00
Iron car axles .....	34.00 to 35.00
Locomotive axles, steel .....	33.00 to 34.00
Steel car axles .....	31.00 to 32.00
Railroad malleable .....	24.00 to 25.00
Cast iron wheels .....	31.00 to 32.00
Roller steel wheels .....	27.00 to 28.00
Machine-shop turnings .....	15.00 to 16.00
Sheet bar, crop ends (at origin) ..	29.00 to 30.00
Heavy breakable cast .....	23.00 to 24.00
Cast iron borings .....	19.00 to 20.00
No. 1 railroad wrought .....	27.00 to 28.00



# A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

## For Early Delivery

	Dec. 16, 1919	Dec. 9, 1919	Nov. 18, 1919	Dec. 17, 1918
<b>Pig Iron, Per Gross Ton:</b>				
No. 2 X, Philadelphia...	\$41.10	\$40.10	\$36.10	\$39.15
No. 2 Valley, furnace...	38.00	36.00	32.00	34.00
No. 2 Southern, Cin'ti...	38.60	38.60	34.60	37.60
No. 2, Birmingham, Ala...	35.00	35.00	31.00	34.00
No. 2, furnace, Chicago...	40.00	40.00	32.00	34.00
Basic, del'd, eastern Pa...	35.00	35.00	31.25	36.90
Basic, Valley furnace...	35.00	34.00	30.00	33.00
Bessemer, Pittsburgh...	37.40	36.40	32.90	36.60
Malleable, Ch'go...	40.50	40.50	32.50	34.50
Malleable, Valley...	37.00	35.00	32.00	34.50
Gray forge, Pittsburgh...	36.40	36.40	32.40	34.40
L. S. charcoal, Chicago...	42.50	42.50	37.50	38.85

<b>Rails, Billets, Etc., Per Gross Ton:</b>				
Bess. rails, heavy, at mill	\$45.00	\$45.00	\$45.00	\$55.00
O.-h. rails, heavy, at mill	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh...	48.00	45.00	42.00	43.50
O.-h. billets, Pittsburgh...	48.00	45.00	42.00	43.50
O.-h. sheet bars, P'gh...	50.00	48.00	45.00	47.00
Forging billets, base, P'gh	60.00	60.00	57.00	60.00
O.-h. billets, Phila...	54.00	54.00	47.50	47.50
Wire rods, Pittsburgh...	60.00	60.00	55.00	57.00

<b>Finished Iron and Steel,</b>				
Per Lb. to Large Buyers: Cents				
Iron bars, Philadelphia...	3.745	3.245	3.245	3.745
Iron bars, Pittsburgh...	3.25	3.25	3.10	3.50
Iron bars, Chicago...	2.87	2.77	2.72	3.50
Steel bars, Pittsburgh...	2.75	2.75	2.75	2.70
Steel bars, New York...	3.27	3.12	3.02	2.97
Tank plates, Pittsburgh...	2.65	2.65	2.65	3.00
Tank plates, New York...	3.02	2.92	2.92	3.27
Beams, etc., Pittsburgh...	2.45	2.45	2.45	2.80
Beams, etc., New York...	2.82	2.72	2.72	3.07
Skelp, grooved steel, P'gh	2.45	2.45	2.45	2.70
Skelp, sheared steel, P'gh	2.65	2.65	2.65	3.00
Steel hoops, Pittsburgh...	3.25	3.25	3.25	3.30

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.  
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

<b>Sheets, Nails and Wire, Dec. 16, Dec. 9, Nov. 18, Dec. 17,</b>				
Per Lb. to Large Buyers: Cents				
1919	1919	1919	1918	
Sheets, black, No. 28, P'gh	4.35	4.35	4.35	4.70
Sheets, galv., No. 28, P'gh	5.70	5.70	5.70	6.05
Wire nails, Pittsburgh...	4.50	4.00	3.50	3.50
Plain wire, P'gh...	3.25	3.25	3.10	3.25
Barbed wire, galv., P'gh...	4.45	4.45	4.25	4.25
Tin plate, 100-lb. box, P'gh	\$7.00	\$7.00	\$7.00	\$7.35

<b>Old Material, Per Gross Ton:</b>				
Carwheels, Chicago...	\$30.00	\$30.00	\$28.00	\$27.00
Carwheels, Philadelphia...	30.00	30.00	28.00	29.00
Heavy steel scrap, P'gh...	25.00	24.00	23.00	25.00
Heavy steel scrap, Phila...	22.50	22.50	20.50	25.00
Heavy steel scrap, Ch'go...	20.50	20.50	18.00	23.00
No. 1 cast, Pittsburgh...	30.00	30.00	28.00	27.00
No. 1 cast, Philadelphia...	31.00	30.00	29.00	29.00
No. 1 cast, Ch'go (net ton)	32.50	29.50	28.50	26.00
No. 1 RR. wrot, Phila...	30.00	30.00	28.00	32.00
No. 1 RR. wrot, Ch'go (net)	23.00	23.00	23.00	25.00

<b>Coke, Connellsville,</b>				
Per Net Ton at Oven:				
Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$6.00
Furnace coke, future...	6.00	6.00	6.00	6.00
Foundry coke, prompt...	7.00	7.00	7.00	7.00
Foundry coke, future...	7.00	7.00	7.00	7.00

<b>Metals,</b>				
Per Lb. to Large Buyers: Cents				
1919	1919	1919	1918	
Lake Copper, New York...	19.25	19.00	20.50	26.00
Electrolytic copper, N. Y.	18.87 1/2	18.50	20.00	26.00
Spelter, St. Louis...	8.45	8.37 1/2	7.95	8.15
Spelter, New York...	8.60	8.72 1/2	8.30	8.50
Lead, St. Louis...	6.00	6.65	6.55	6.40
Lead, New York...	7.15	6.90	6.80	6.75
Tin, New York...	53.50	54.00	53.87 1/2	72.00
Antimony (Asiatic), N. Y.	9.02 1/2	9.50	9.25	8.00

## Chicago

CHICAGO, Dec. 16.

Notwithstanding the resumption of coal mining, fuel promises to continue a serious problem for the mills in this district throughout the winter. A spell of severe weather coupled with heavy snows would bring about a situation as critical as the one just passed. The Illinois Steel Co. is operating at about the same rate as a week ago, but hopes to start an additional blast furnace at South Chicago and Gary early this week. Its No. 2 open-hearth plant at South Works has been re-equipped and is now burning oil. The Inland Steel Co. continues to use coking coal for steam purposes and is operating at about 80 per cent of ingot capacity. The Republic Iron & Steel Co. expects to start its Moline rail-carbon mill next Monday and its East Chicago bar iron mill the following week. The Calumet Steel Co. hopes to resume operation at its Chicago Heights hard steel bar mill early next week.

The foremost independent is sold out for six months on all products except track bolts, spikes and rivets. Most of this tonnage was booked on the basis of prices ruling at the time of delivery. The leading interest, although it refuses to promise delivery, can, according to present prospects, take care of additional tonnage in plates and shapes during the first half. It has sold into third quarter on small sizes of mild steel bars, but on the heavier sizes is in a position to take additional business for second quarter.

**Pig Iron.**—There is a strong demand for malleable pig iron, three pending inquiries calling for first quarter and first half delivery aggregating 4500 tons. A recent sale of 500 tons of malleable for prompt shipment was made on the basis of \$37, Valley furnace. A considerable volume of malleable has been moving into this territory from the Valley at about the same price, but higher quotations are predicted. One Ohio producer with a \$3.80 freight to Chicago is quoting \$38.25 furnace for prompt shipment and \$39.25 for first quarter. There continues to be an active demand for low silicon foundry but the higher silicons and silveries are not moving as fast as heretofore. One Southern furnace continues to book December business in foundry iron at \$35 base furnace, but is not yet quoting on first quarter delivery. A Tennessee and a Virginia furnace

are now quoting \$40 base furnace on first quarter shipments. Another Virginia producer offers a limited tonnage of prompt foundry ranging from 2 to 5 per cent silicon at \$38 base furnace. A Kentucky stack has booked 600 tons at \$38 base furnace, or \$42.10 Chicago. The local furnaces are taking only a limited amount of business to accommodate old customers. A seller in the Chicago district has some 4 per cent Southern foundry for spot delivery which he is offering on a \$35 Birmingham base.

The following quotations are for iron delivered at consumer's yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnaces and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, average silicon 1.50, f.o.b. furnace, average freight to Chicago.	\$2.50 (other grades subject to usual differentials)	\$40.00 to \$45.00
Northern coke foundry, No. 2 silicon, 1.75 to 2.25		40.00
Northern high phosphorus foundry		40.00
Southern coke, No. 1 foundry and No. 1 soft, silicon, 2.75 to 3.25		42.70
Southern coke, No. 2 foundry, silicon, 2.25 to 2.75		41.35
Southern foundry, silicon 1.75 to 2.25		40.00
Malleable, not over 2.25 silicon		40.50
Basic		39.00
Low phosphorus (copper free)		45.00
Silvery, 7 per cent		49.15 to 51.80

**Ferroalloys.**—Four hundred tons of ferromanganese eighty per cent has been sold in this territory at \$120 delivered.

We quote 80 per cent ferromanganese at \$120 delivered; 50 per cent ferrosilicon at \$85 to \$90 delivered; spiegeleisen, 18 to 22 per cent, \$40 furnace.

**Plates.**—The foremost interest has booked 70 000 tons of steel, about two-thirds plates, from a Pacific Coast shipyard. A local jobber affiliated with an eastern mill, has taken an order for 27,000 tons from a shipbuilder in the same section of the country. These two orders with the 9000-ton order mentioned a week ago make a total of more than 100,000 tons for coast vessel construction. Some months ago, the shipbuilding industry on the Pacific was dull, but with the yards in other parts of the country full, Coast builders are receiving generous orders despite their higher costs. About 15,000 tons of steel for car repair work is pending. The South African Railways are inquiring for 100 car underframes and 100 sets of trucks, involving 1800 tons of plates, shapes and bars. The International Sleeping Car Co. is in the market for 50 sleeping cars.

The mill quotation is 2.65c. Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers quote 3.67c. for plates out of stock.

**Structural Material.**—The Baker Iron Works, Los Angeles, will fabricate 3000 tons for an addition to the Letts Building in that city. The Paris-Hugo bridge over the Red River, Hugo, Okla., will involve 850 tons which is reported to have been awarded to the Virginia Bridge & Iron Co. Pending jobs include the Wrigley Building, Chicago, 4500 tons, the Seaman Body Corporation plant, Milwaukee, 800 tons; an addition to the Hamilton Club, Chicago, 600 tons, and a shipping building and loading dock for the Oakland Motor Car Co., Pontiac, Mich., 500 tons. Other fabricating awards include 750 tons which the Milwaukee Bridge Co. will fabricate for the Seaman Body Corporation, Milwaukee.

The mill quotation is 2.45c. Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote \$3.47 for materials out of warehouse.

**Iron and Steel Bars.**—Bar iron has advanced to 2.87c., Chicago, with only one maker in a position to entertain business. This producer, however, has as yet refused to quote for 1920 delivery. Only one rail-carbon steel bar mill is taking business and it is asking 3c., mill, on prompt shipments and is booking tonnage for 1920 on the basis of prices ruling at the time of delivery.

Mill prices are: Mild steel bars, 2.85c. to 3.25c., Pittsburgh, taking a freight rate of 27c. per 100 lb.; common bar iron, 2.87c. to 3c. Chicago; rail carbon, 3c. mill. Jobbers quote 3.37c. for steel bars out of warehouse.

**Bolts and Nuts.**—Bolt and nut manufacturers are hampered by the scarcity of nut stock and fear that they will be forced to curtail operations materially on this account. Such a reduction in output would further stimulate prices.

Jobbers quote: Structural rivets, 4.72c.; boiler rivets, 4.82c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 35 and 5 per cent off; larger sizes, 25 and 5 off; carriage bolts up to  $\frac{3}{4}$  x 6 in., 30 off; larger sizes, 20 off; hot pressed nuts, square tapped and hexagon tapped, \$1.45 off; coach or lag screws, gimlet points, square heads, 40 and 5 per cent off. Quantity extras are unchanged.

**Cast Iron Pipe.**—Toledo will take bids on 1570 tons of cast iron pipe to-day.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$65.80; 6-in. and above, \$62.80; class A and gas pipe, \$2 extra.

#### Sheets

Mill quotations are 4.35c. for No. 28 black, 3.55c. for No. 10 blue annealed, and 5.70c. for No. 28 galvanized.

Jobbers quote Chicago delivery out of stock: No. 10 blue annealed, 4.57c.; No. 28 black, 5.62c., and No. 28 galvanized, 6.97c.

#### Rails and Track Supplies

Standard railroad spikes, 3.35c. Pittsburgh. Track bolts with square nuts, 4.35c. Pittsburgh. Steel tie plates and iron angle bars, 2.75c. Pittsburgh and Chicago; tie plates, iron, 2.90c. f.o.b. makers' mills. Light rails, 2.45c. f.o.b. makers' mills, with usual extras.

**Old Material.**—Scrap is beginning to recover from the effects of the coal strike, but is still dull in most grades. Cast scrap and malleable are exceptions and have again advanced. The Louisville and Nashville is offering 2000 tons and the Chesapeake & Ohio a like amount stop. The Southern has advertised 1500 and the Santa Fe 1200 tons.

We quote delivery in buyer's yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$27.00 to \$28.00
Relaying rails	40.00 to 50.00
Car wheels	30.00 to 31.00
Steel rails, rerolling	31.00 to 32.00
Steel rails less than 3 ft.	25.00 to 25.50
Heavy melting steel	20.50 to 21.50
Frogs, switches and guards, cut apart	20.50 to 21.50
Shoveling steel	20.50 to 21.00
Per Net Ton	
Iron angles and splice bars	\$27.50 to \$28.50
Steel angle bars	21.50 to 22.00
Iron arch bars and transoms	19.25 to 30.25
Iron car axles	33.50 to 34.50
Steel car axles	30.00 to 30.50
No. 1 busheling	18.50 to 19.00
No. 2 busheling	13.25 to 13.75
Cut forge	20.50 to 21.00
Pipes and flues	17.00 to 17.50
No. 1 railroad wrought	23.00 to 24.00
No. 2 railroad wrought	20.50 to 21.00
Steel knuckles and couplers	22.00 to 22.50
Coil springs	23.00 to 23.50
No. 1 cast	32.50 to 33.00
Boiler punchings	23.50 to 24.00
Locomotive tires, smooth	20.50 to 21.00
Machine-shop turnings	10.50 to 11.00
Cast borings	11.75 to 12.75
Stove plate	25.50 to 26.50
Grate bars	25.25 to 26.25
Brake shoes	21.50 to 22.50
Railroad malleable	25.00 to 26.00
Agricultural malleable	25.00 to 26.00
Country mixed	16.50 to 17.50

## Cleveland

CLEVELAND, Dec. 16.

**Iron Ore.**—With the close of the Lake season of navigation there is more ore on Lake Erie docks than at the same time in any previous year in spite of a falling off approximately of 14,000,000 tons in the movement this season as compared with last year. The dock balance Dec. 1 was 10,454,843 gross tons as compared with 10,376,509 tons on the same date a year ago. Receipts at Lake Erie ports for the season to Dec. 1 were 36,658,795 tons as compared with 47,639,801 tons during the same period last year. Shipments from Lake Erie docks to furnaces to Dec. 1 were 25,306,777 tons as compared with 35,747,256 tons last year. Prices f.o.b. lower lake ports are:

Old range Bessemer, \$6.45; old range non-Bessemer, \$5.70; Mesaba Bessemer, \$6.20; Mesaba non-Bessemer, \$5.55.

**Pig Iron.**—Another \$2 a ton advance has been made to \$38 furnace on foundry pig iron, several round lots being sold at that price by Valley furnaces for No. 2 and at \$39.25 for 2.25 to 2.75 silicon. The sales put Valley iron on the same basis as Buffalo. Cleveland furnaces are entirely out of the market, so that no local sales have been made at the advance, but \$38 is now regarded as the minimum price. Malleable iron for prompt shipment has sold at \$38.25 in the Valley. Considerable inquiry continues to come out for foundry iron for the first quarter and first half, but very little is to be had and there is still a fair demand for prompt shipment iron, but practically none of this is available. Southern Ohio foundry iron is being offered in this territory at \$38.25 for No. 2 for the first quarter, but buyers are unwilling to pay that price with the freight added. Basic iron is quiet and has not advanced since the recent \$34 price was made. Basic inquiries include one from Southern Ohio for 2,000 tons for early shipment and one for 500 to 1,000 tons for export to Spain.

Basic	\$35.00
Northern No. 2 foundry, silicon 1.75 to 2.25	38.40
Southern foundry, silicon 2.25 to 2.75	41.35
Gray forge	37.40
Ohio silvery, silicon 8 per cent	52.40
Standard low phos., Valley furnace	\$43.00 to 44.00

**Coke.**—Many foundries have low stocks of coke and are urging shipments which were curtailed last week by the Government restrictions. There is some new inquiry, but no coke is being offered for prompt shipment or contract.

**Finished Iron and Steel.**—The settlement of the steel strike will result in increased production by Cleveland and some other northern Ohio steel plants where operations have been curtailed. The Otis Steel Co. has placed its Lakeside plant on double turn, this plant having been operated on single turn since its resumption after the steel strike, and the Union Rolling Mill Co. has resumed operations in all departments for the first time since the steel strike. There is a heavy demand for steel for early shipments and mills are getting a great deal of inquiry for round lots for future delivery, but very few are accepting any additional orders. There is a famine in steel bars in small sizes and buyers are scouring warehouses in the Central West to fill their orders. The demand for hard steel bars is very heavy and the market is firm at 3c. The demand for plates is heavy and an Eastern mill has advanced its price to 3c. at mill. There is some activity in structural material, largely for stock, and orders are being taken on the basis of 2.60c. Eastern mill. A heavy tonnage of sheets could be booked were mills in a position to take orders. The acute shortage of nails continues and mills have none to offer for early shipment. A Cleveland mill has taken a first quarter contract for slabs at \$50. Jobbers quote:

Steel bars, 3.25c.; plates, 3.57c.; structural shapes, 3.37c.; bands and hoops, 3.97c.; No. 10 blue annealed sheets, 4.27c.; No. 28 black sheets, 5.27c.; No. 28 galvanized sheets, 6.62c.

**Old Material.**—With the ending of the coal strike, local mills are accepting scrap shipments which they had been holding back for several weeks, but cars have been diverted to the coal movement, so that few are available for scrap. The market is firm. Prices on



iron car axles and railroad malleable have advanced sharply and heavy melting steel and several other grades are also higher. Cast scrap is scarce and is now moving at around \$30. Activity is confined almost wholly to dealers. Steel plants are not expected to come in the market before January.

Heavy melting steel .....	\$21.00 to \$21.50
Steel rails, under 3 ft. ....	25.00 to 26.00
Steel rails, rerolling .....	30.00 to 31.00
Iron rails .....	29.00 to 30.00
Iron car axles .....	39.00 to 40.00
Steel car axles .....	34.00 to 35.00
Low phosphorus melting scrap .....	23.00 to 23.50
Cast borings .....	15.50 to 15.75
Iron and steel turnings and drillings .....	13.00 to 13.50
Short turnings (for blast furnaces) .....	14.00 to 14.50
Compressed steel .....	17.75 to 18.00
No. 1 railroad wrought .....	22.00 to 23.00
Railroad malleable .....	25.00 to 27.00
Agricultural malleable .....	21.00 to 22.00
Steel axle turnings .....	17.00 to 17.50
Light bundled sheet scrap .....	14.50 to 15.00
No. 1 cast .....	29.50 to 30.00
No. 1 busheling .....	20.00 to 21.00
Drop forge flashings, 10 in. and under .....	18.50 to 19.50
Drop forge flashings, over 10 in. ....	16.50 to 17.00
Railroad grate bars .....	25.00 to 25.50
Stove plate .....	25.50 to 26.50

## Cincinnati

CINCINNATI, Dec. 16.

**Pig Iron.**—Irregularity has been the keynote of the pig iron market during the past week. There has been practically no iron sold and consequently it has been very difficult to get a line on what is going on. A Kentucky interest is in the market for Southern iron for first half shipment at \$35, but no deal has yet been closed at this figure. Prices are very irregular and small lots of Southern have been disposed of for prompt shipment at from \$35 to \$37. Inquiry is not particularly heavy. Sales of Northern iron, silicon 1.75 to 2.25, during the week are practically negligible. The price, \$36.75, was the same as quoted last week. One interest, however, is holding iron for prompt shipment at \$38 to \$39 Iron-ton. This same interest last week sold a considerable tonnage of off grade iron at \$38.25. Small lots of Ohio silvery are still being disposed of at \$50. A local interest was in the market for 5000 tons of basic last week, but when the coal strike settlement was announced, inquiry was withdrawn. The coke shortage is causing much anxiety, and should the situation not shortly improve, consumers will be up against a serious proposition. No furnaces have been banked during the past week in this territory.

Based on freight rates of \$3.60 from Birmingham and \$1.80 from Iron-ton, we quote f.o.b. Cincinnati:

Southern coke, silicon 1.75 to 2.25 (base price) .....	\$38.60 to \$39.60
Southern coke, silicon 2.25 to 2.75 (No. 2 soft) .....	40.00 to 41.00
Ohio silvery, 8 per cent silicon .....	51.80
Southern Ohio coke, silicon 1.75 to 2.25 (No. 2) .....	38.55
Basic, Northern .....	36.05
Standard Southern car wheel .....	48.60
Malleable .....	38.05 to 39.05

**Old Material.**—The demand for scrap has been heavy and prices have been marked up in most lines. This is particularly true of cast scrap, some small lots of which have been disposed of at an advance of \$5. Dealers generally are holding for higher prices, only small quantities being put on the market.

Per Gross Ton	
Bundled sheet .....	\$14.00 to \$15.00
Old iron rails .....	25.00 to 26.00
Relaying rails, 50 lb. and up .....	41.00 to 42.00
Rerolling steel rails .....	23.00 to 24.00
Heavy melting steel .....	19.00 to 20.00
Steel rails for melting .....	21.00 to 22.00
Old car wheels .....	21.00 to 22.00
No. 1 railroad wrought .....	20.00 to 21.00

Per Net Ton	
Cast borings .....	\$10.50 to \$11.00
Steel turnings .....	10.00 to 10.50
Railroad cast .....	26.00 to 27.00
No. 1 machinery .....	29.00 to 30.00
Burnt scrap .....	16.00 to 17.00
Iron axles .....	25.50 to 26.00
Locomotive tires (smooth inside) .....	20.50 to 21.50
Pipes and flues .....	15.00 to 15.50
Malleable cast .....	16.50 to 17.00
Railroad tank and sheet .....	14.00 to 14.50

**Coke.**—Coke has been in good demand, one local company disposing of 5000 tons last week at the Government price.

**Finished Material.**—The demand for finished products is very active, sheets particularly being in great demand. One Detroit automobile factory has instructed its agents throughout the country to buy up all the sheets they can secure from any sources.

## Buffalo

BUFFALO, Dec. 15.

**Pig Iron.**—There is no weakening in demand, but with most furnaces sold up conditions for first half act as a bar to the making of further sales for that period except in very limited amounts, such small tonnages as are available being for the latter part of the second quarter and restricted, in an endeavor to hold sufficient production in reserve for emergency needs of regular customers that may require to be helped out. One operating interest, however, states that although it has taken on between 5000 and 10,000 tons of foundry grades the past week, largely for second quarter, it still has some second quarter capacity for booking. One of its furnaces now out for relining will be used after relining is finished to provide iron against emergency call. It has three other stacks working to full capacity. Lack of coal has made it imperative to watch production very closely to furnish foundry grades already contracted for, upon which all effort is being concentrated. No malleable or Bessemer is now being produced. No basic can be obtained for less than \$38, furnace. Furnacemen are not giving consideration to the selling of third quarter production owing to the uncertainty as to production costs.

No. 1 foundry, 2.75 to 3.25 silicon .....	\$41.00
No. 2X, 2.25 to 2.75 silicon .....	39.25
No. 2 plain foundry, 1.75 to 2.25 silicon .....	38.00
Malleable, silicon not over 2.25 .....	39.25
Basic .....	36.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo .....	42.60

**Old Material.**—The market has maintained its strength the past week during the lull in demand attributable to the coal strike and now that it is over, dealers look for still stronger market conditions and increased demand. Some dealers received temporary stop orders on shipments awaiting outcome of the strike, but these restrictions it is anticipated will be promptly rescinded. Several inquiries for good sized tonnages of heavy melting steel have just come in from outside points and local mills are again in the market and a large aggregate selling of heavy melting is in view. Prices the past week have remained at \$23.50 for this grade, but dealers expect prices will go higher in the near future. Some fairly good tonnages of turnings and borings have been sold during the week, and there appears to be no question that the immediate future will bring out a good volume of business in nearly all lines. There has been no change in prices from last week's report.

Heavy melting steel, regular grades .....	\$23.00 to \$23.50
Low phosphorus, 0.04 and under .....	27.00 to 28.00
No. 1 railroad wrought .....	28.00 to 29.00
No. 1 machinery cast .....	29.00 to 29.50
Iron axles .....	33.00 to 34.00
Steel axles .....	33.00 to 36.00
Car wheels .....	24.50 to 27.50
Railroad malleable .....	23.00 to 24.00
Machine-shop turnings .....	13.50 to 14.00
Heavy axle turnings .....	18.50 to 19.50
Clean cast borings .....	19.00 to 20.00
Iron rails .....	28.00 to 29.00
Locomotive grate bars .....	22.00 to 22.50
Stove plate .....	23.00 to 23.50
Wrought pipe .....	18.50 to 19.00
No. 1 busheling .....	20.00 to 21.00
Bundled sheet stamping .....	16.00 to 17.00

**Finished Iron and Steel.**—Inquiries for all types of steel products during the week have been of enlarged volume and selling agents, following instructions from headquarters, are submitting inquiries for review. Some agencies are accepting orders from old established customers, subject to mills' ability to ship, while other companies are declining to entertain new obligations, preferring to wait until they can more accurately determine the effect of the coal strike. There is an acute shortage of bars and small rounds, jobbers' stocks being virtually depleted. Orders have been placed by eastern New York consumers with Chicago jobbers due

to inability to secure requirements either from mills or eastern distributors, price taking a secondary position. In wire goods there is dearth of supply and difficulty is experienced in securing shipment on existing orders. In spite of the abnormally high rate of exchange, inquiry from Canada, especially for structural material and plates, is very heavy.

## Boston

BOSTON, Dec. 16.

**Pig Iron.**—Local sales of pig iron the past week have been more limited. This condition of business is due to two facts; most furnaces have little to offer, and New England foundries, as a general thing, are well covered on immediate and first quarter requirements and therefore are inclined to await further developments. There have been several thousand tons sold, nevertheless, some of it for spot and the rest for first quarter delivery, to consumers who have been uneasy because of the slowness of iron coming forward. The bulk of such sales involved silicon 2.25 to 2.75 eastern Pennsylvania and Virginia at or about \$40 furnace, but furnaces which sold are out of the market now. Small tonnages of eastern Pennsylvania 2.25 to 2.75 sold to Connecticut consumers as high as \$42 furnace. A Buffalo company is reported as offering a little first quarter iron, as is the leading Virginia company, most of it running high in silicon and manganese. An eastern Massachusetts consumer bought 300 tons of Ohio, silicon 2.25 to 2.75 at \$41 furnace, which with a \$5.20 freight, brings the delivered price up to \$46.20. Buffalo irons continue scarce, furnaces having all the business on their books they care for at the moment. Only one of the Susquehanna's four furnaces is operating. Orders for more than 1000 tons of Alabama iron submitted by local representatives have been turned down by furnaces. Alabama iron has been sold here since last reports, however, some of it through Philadelphia connections at private terms. The Draper Co., Hopedale, Mass., is reported as in the market for 1000 tons silicon 2.50 and higher. Quotations for Boston delivery follow:

Eastern Pa., No. 2 X silicon 2.25 to 2.75	\$41.90 to \$42.90
Eastern Pa., No. 2 plain, silicon 1.75 to 2.25	40.90 to 41.90
Buffalo, No. 2 X silicon 2.25 to 2.75	41.90 to 42.90
Buffalo, No. 2 plain silicon 1.75 to 2.25	40.90 to 41.90
Virginia, No. 2 X, silicon 2.25 to 2.75	42.95 to 43.70
Virginia, No. 2 plain silicon 1.75 to 2.25	41.70 to 42.70
Alabama, No. 2 X, silicon 2.25 to 2.75	46.00
Alabama, No. 2 plain, sil. 1.75 to 2.25	44.60

**Finished Iron and Steel.**—One of the largest independent mill representatives here has advanced shapes \$2 a ton to a 2.55c Pittsburgh base. The general price on plates, as quoted here, is now 2.75c Pittsburgh base, but one of the most important mills is getting 3c for nearby deliveries and 3.25c for first quarter deliveries. Bars have been sold here during the past week at prices showing a wide range, but only in small amounts, as most of the mills virtually are out of the market. New England railroads have been comparatively liberal purchasers of plates the past week or so, but for car repair work only. Stone & Webster have a contract for a 20,000 k.w. electric power plant at New Bedford, Mass., calling for 500 to 600 tons of shapes, and another at Hartford, Conn., for a rubber plant extension for 1200 to 1400 tons of concrete bars. Its American Radiator Co., Boston plant job, called for 400 tons structural, and its First National Bank Building approximately 2000 tons. James H. Tower Co., Providence, has a 375-ton structural contract for the Beacon Mfg. Co., New Bedford, Mass., improvements, 150 tons on the Warwick Mills, Centerville, R. I., additions, and 100 tons on the J. & P. Coats, Pawtucket, R. I., job. Bids are being asked on 300 tons for a Boston storage warehouse.

**Warehouse Business.**—The past week has witnessed a further advance in prices all down the line. Soft steel bars are 25c per 100 lb. higher at \$4 base, concrete bars, tire steels, hoops and bands are 25c higher, spring and toe calk steel 50c, refined iron 25c at \$4.10

base, blue annealed sheets 20c higher and black sheets 50c. Expansion bolts have been marked up 10 per cent and most kinds of nuts cost more money. Small sales of wire nails recently have been made at \$6, \$7 and \$8 per keg. Bars, especially  $\frac{1}{4}$ -in., are very hard to obtain except in dribbling lots. In fact, warehouse stocks of all kinds are very badly broken, while the demand never before in the history of the trade was as heavy as it is to-day. Price has ceased to be a factor with the consumer.

**Jobbers quote:** Steel bars, cold rolled rounds, \$5.50 per 100 lb. base; squares, hexagons, flats, \$6 base; soft steel, flats, rounds, squares, \$4 base; concrete bars, plain round, square \$4; twisted squares \$4.50; structural steel under 3 in., \$1; structural 3 in. and over \$3.75; tire steel, \$4.70; spring steel, open hearth, \$8.50; special, \$12.50; toe calk steel, \$6; steel hoops, \$5.45; steel bands, \$5.20; iron, refined, except as follows, \$1.10 base;  $\frac{1}{4}$  in., 9/16 in. round, square and 2 $\frac{1}{2}$  in. round, square and larger, \$4.50 base; 7/16 in. round, square and smaller, \$5.50 base; over 6 in. wide, \$5.50 base, best refined iron, \$5.50 base; Wayne iron, \$7 base; band iron, \$5.20; hoop iron, \$5.45; Norway iron, \$20; No. 10 blue annealed sheets, \$5.30 base; No. 28 black sheets, \$7.65; No. 28 galvanized sheets, \$8.50; plates, \$3.95 base.

**Coke.**—The coke market has ruled quiet and steady on a \$11.90 delivered base during the past week. The New England Coal & Coke Co. is slightly behind on deliveries, but taken as a whole is doing as well as could be expected in view of the car situation. The Fuel Administration one day recently ruled that all New England foundrymen must make application with their local freight agent for a permit to receive coke. The agent in turn was to submit the application to the sub-coal committee sitting at the South Station, Boston, who would issue a permit to the shipper. The order was withdrawn the next day, but for a few hours the coke and foundry interests were considerably upset.

**Old Material.**—Although a considerable business in heavy melting steel has been put through at former prices during the past week, there has been some slowing up in purchases of old material, and especially of pipe, for shipment outside New England, a condition generally believed to be due to the coal strike developments. Foundries in this section, however, have continued to buy cast scrap whenever possible, but there is still a disposition on the part of sellers to hold for higher prices because of the comparative scarcity of offerings. A fair tonnage of No. 1 machinery cast has changed hands on a delivered base of \$34.75, and there have been some sales made as high as \$35 and \$36. No. 2 has sold on a delivered base of \$31 and \$32, and stove plate at \$24 and \$25, but the supply of the latter is rather limited. So anxious have some foundries been for supplies that dealers have been able to dispose of No. 1 and No. 2 mixed on a delivered base of \$34. The same consumers are making bids on wrought iron rails and boiler plates, but few are to be had at any price. Fancy prices have been paid for borings since last reports; 400 tons being taken by chemical interests at \$21 shipping point, and several hundred more tons at \$20.50 shipping point. Dealers' buying prices, delivered through New England yards, per gross ton, follow:

No. 1 heavy melting steel	\$18.00 to \$18.50
No. 1 railroad wrought	24.50 to 25.00
No. 1 yard wrought	22.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	17.50 to 18.00
Machine-shop turnings	13.50 to 14.00
Cast iron borings	16.00 to 17.50
Heavy axle turnings	15.50 to 16.00
Blast furnace borings and turnings	12.50 to 13.00
Forge scrap	13.50 to 14.00
Bundled skeleton	13.50 to 14.50
Steel car axles	27.00 to 28.00
Car wheels	28.00 to 29.00
Machinery cast	32.00 to 33.00
No. 2 cast	29.00 to 30.00
Stove plate	21.00 to 22.00
Railroad malleable	20.00
Rerolling rails	26.50 to 27.50

## San Francisco

SAN FRANCISCO, Dec. 9.

Under the existing conditions in the local labor market the metal markets of the San Francisco district are naturally dull. In the interior a good demand has developed and there is also considerable inquiry for export.

The most important order for steel plates for tank-



age which has been given for a long time on this coast outside the shipyards has just been awarded on bid to the Western Pipe & Steel Co., San Francisco, by the General Petroleum Co., San Francisco. The order is for 2,000 tons of steel plate, fabricated, at a price approximately \$225,000, and is for shipment to the Tampico oil fields, Mexico. Incidentally this is the first official public announcement that the General Petroleum Co. is drilling wells in that field.

**Wrought Pipe.**—The demand for wrought pipe is in excess of the supply, as many municipalities are now preparing to make extensions and replacements which have been held up for the past two years. The market for improvement bonds is reported much easier and it is said that a number of municipalities are now selling bonds for which there were no bidders a few months ago.

**Cast Iron Pipe.**—The same condition of increased demand for cast iron pipe exists as for wrought pipe, notwithstanding an advance of \$3 to a \$56 base for cast iron. Seattle is letting a contract for 3000 tons of 4 in., 6 in. and 8 in. pipe. Inglewood and El Segundo have recently let contracts for about 30,000 ft. of pipe.

**Old Material.**—With the partial resumption of work at the shipyards, there was some steel scrap on this market during the past week. It sold at \$23 net. With the foundries out of the market, cast iron scrap is not moving and no satisfactory quotation can be given.

## Birmingham

BIRMINGHAM, Dec. 15.

**Pig Iron.**—All Birmingham iron makers are practically put off the market with the exception of small tonnages sold on direct inquiry of consumer at \$35 a ton with the silicon differentials firmly adhered to. The week's business was small. Furnace capacity for first half is about 50 per cent cared for, the remainder being held open. Consumers seem to be taking a breathing spell, but that is partially owing to the non-selling attitude of makers. Stocks went down 20,000 to 25,000 tons in November. Present stocks of foundry are not over 70,000 tons and it belongs to consumers for the most part. Jenifer furnace, banked on account of coke, will soon resume. The Tennessee company blew out the small furnace at Bessemer making ferro-manganese for its own consumption. All other stacks remained operating through the coal strike, including eight of Tennessee and three each of Sloss-Sheffield and Woodward. The Alabama Co. continued the operation of its second stack at Gadsden, which resumed just prior to the Garfield arrangement. Steel works remained at near capacity operation. Pipe works kept going in spite of the scramble for coke, which they managed somehow to obtain. All finishing mills are behind on orders. Iron sellers are conservative, but further advances, in view of demand and low stocks, seem imminent. An eastern consumer has tried to secure 2000 tons for second, or even third quarter at \$35. No attention is paid to export offers. We quote per gross ton f.o.b. Birmingham district furnaces prices as follows:

Foundry, silicon 1.75 to 2.25.....	\$35.00
Basic .....	34.00

**Old Material.**—The scrap market has been active as to steel and No. 1 cast, movements to Atlanta and Knoxville as well as in the district being unusually heavy, showing great activity in finishing mills of all kinds. A dollar over the quoted price is frequently obtained. We quote per gross ton f.o.b. Birmingham district yards, prices to consumers, as follows:

Steel rails .....	\$20.00 to \$21.00
No. 1 heavy steel.....	19.00 to 20.00
Cast iron borings.....	14.00 to 15.00
Machine-shop turnings .....	14.00 to 15.00
Stove plate .....	22.00 to 23.00
No. 1 cast.....	24.00 to 25.00
Car wheels .....	24.00 to 25.00
Tramcar wheels .....	23.00 to 24.00
Steel axles .....	26.00 to 27.00
No. 1 wrought.....	21.00 to 22.00

**Coal and Coke.**—The coal output had passed normal at the end of the week closing Dec. 13. Coke output was

just enough to keep things going. Prices remain at \$9 for contracts and \$9.50 for spot.

**Cast Iron Pipe.**—Both sanitary and water pipe concerns are bare of stocks, shipment being from shop to consumer. There is an avalanche of orders from southern municipalities. Oil pipe is extremely active. The outlook is excellent.

## St. Louis

ST. LOUIS, Dec. 15.

**Pig Iron.**—Although the aggregate of demand for pig iron continues large, there are no big individual inquiries in the market and the transactions are being limited very materially by the indisposition of the furnaces to accept orders for 1920 delivery at least until the situation clears up more definitely. A considerable number of furnaces represented in this market have withdrawn all quotations and are understood to be holding off on sales for an advance in prices. No. 2 Southern is held here at approximately \$36. Birmingham, while the northern furnaces are not disposed to make prices or take orders at offered prices. All general consumers want iron and would buy, but for the attitude of the furnaces and it is generally felt that any opening up of the sources of supply would be followed by some very heavy buying in the aggregate at least. Some small sales and also some inquiries for charcoal iron are reported, but not in large total. All consumers want iron contracted and are pushing deliveries, even asking for deliveries ahead of contract schedule.

**Coke.**—No coke is obtainable at any price in this market, and in consequence there have been no transactions in either metallurgical or domestic coke. The trade here is under the impression that the advance in miners' wages is to be made the basis of an advance of 60c. in coke, but no official statement has been received.

**Finished Iron and Steel.**—The restriction of business in finished products as a result of both the steel and the coal strikes continues and there is very little being done except on material available in warehouse.

**Old Material.**—The scrap dealers have been made more optimistic by the settlement of the coal strike, but have also been affected in the other direction by the slump in stocks and the drop in foreign exchange. As a result, while the general tone is more favorable there is as yet no actually quotable change in prices of scrap. Dealers are doing some speculative buying among themselves, but no consumer buying is being done of any moment as the industries are still closed down and have not resumed operations interrupted by the restrictions put on fuel.

### Per Gross Ton

Old iron rails.....	\$27.50 to \$28.00
Old steel rails, rerolling.....	32.00 to 32.50
Old steel rails, less than 3 ft.....	25.00 to 25.50
Relaying rails, standard sections, subject to inspection.....	38.00 to 45.00
Old car wheels .....	26.00 to 26.50
No. 1 railroad heavy melting steel.....	32.00 to 32.50
Heavy shoveling steel.....	30.50 to 31.00
Ordinary shoveling steel.....	19.50 to 20.00
Frogs, switches and guards, cut apart.....	21.50 to 22.00
Ordinary bundled sheets.....	13.00 to 13.50
Heavy axle and tire turnings.....	15.50 to 16.00

### Per Net Ton

Iron angle bars.....	\$24.00 to \$24.50
Steel angle bars .....	21.50 to 22.00
Iron car axles.....	32.50 to 33.00
Steel car axles.....	32.00 to 32.50
Wrought arch bars and transoms.....	27.00 to 27.50
No. 1 railroad wrought.....	28.00 to 28.50
No. 2 railroad wrought.....	22.00 to 22.50
Railroad springs .....	21.00 to 21.50
Steel couplers and knuckles.....	21.00 to 21.50
Locomotive tires, 42 in. and over, smooth inside .....	21.00 to 21.50
No. 1 dealers' forge.....	20.50 to 21.00
Cast iron borings.....	11.50 to 12.00
No. 1 busheling.....	20.50 to 21.00
No. 1 boiler, cut to sheets and rings.....	17.00 to 17.50
No. 1 railroad cast.....	21.50 to 22.00
Stove plate and light cast.....	25.50 to 26.00
Railroad malleable .....	31.50 to 32.00
Agricultural malleable .....	31.00 to 31.50
Pipes and flues.....	18.50 to 19.00
Heavy railroad sheet and tank.....	17.00 to 17.50
Machine shop turnings .....	12.50 to 13.00
Country mixed .....	18.00 to 18.50
Uncut railroad mixed.....	19.50 to 19.00
Horseshoes .....	21.50 to 22.00

## Philadelphia

PHILADELPHIA, Dec. 16.

**Pig Iron.**—Removal of the restriction on production of coke has given rise to hope that merchant blast furnaces may not be seriously affected by fuel shortage. The Bethlehem Steel Co., which recently banked six furnaces, four at Bethlehem and two at Lebanon, has been trying to buy bee-hive coke with which to resume operation of these stacks. No other Eastern furnaces have banked on account of fuel shortage. There is a falling off in inquiry for foundry iron and a condition of comparative quiet is expected until after the first of the year. Foundry iron continues scarce and buyers are readily found for all available supplies for prompt delivery or first quarter. Prices are higher, \$40, furnace, now being about the minimum quoted by either eastern Pennsylvania or Virginia furnaces for No. 2 X iron, 2.25 to 2.75 per cent silicon. No. 2 X iron has been sold by one furnace in lots up to 500 tons at \$42.80, delivered Philadelphia. The leading Virginia interest is again in the market and has sold No. 2 X at \$39.25, furnace. Another Virginia furnace is asking \$40, furnace, for No. 2 plain. The Pulaski Iron Co. has blown out its stack for relining and is taking no business. No sales of basic iron are reported, but furnaces would quote \$35 or higher. Low phosphorus iron is firm at \$45 for the copper free and \$40 for the copper bearing.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace:

Eastern Penn., No. 2X, 2.25 to 2.75 sil.	\$41.10 to \$42.80
Eastern Penn., No. 2 plain, 1.75 to 2.25 sil.	40.10 to 41.80
Virginia No. 2 X, 2.25 to 2.75 sil.	43.35 to 45.35
Virginia No. 2 plain, 1.75 to 2.25 sil.	43.10 to 44.10
Basic deliv. Eastern Pa. (nominal).	35.00 to 36.00
Gray forge	36.10
Standard low phosphorus (f.o.b. furnace)	45.00
Malleable	36.00 to 37.00
Copper bearing low phosphorus (f.o.b. furnace)	40.00

**Ferroalloys.**—Sales of small lots of ferromanganese have been made at \$120, delivered, for the 80 per cent. At least two British makers have withdrawn from the market for first quarter and one has withdrawn even for second quarter. The Lavino Furnace Co. has imported about 15,000 tons of manganese ore from the Gold Coast of Africa within the past two or three weeks and further shipments are expected. This ore runs high in manganese and may displace the use of Brazilian ore to some extent. Spiegeleisen has been quoted by Eastern makers at about \$40, furnace, for 18 to 20 per cent.

**Semi-Finished Steel.**—Eastern makers have obtained \$50, Pittsburgh, on sizable lots of open-hearth rerolling billets. One sale of 3000 tons was made on this basis. Forging billets command \$60 to \$65, sales having been made at the former figure. Slabs have been sold at \$52.50, Pittsburgh, and probably are not obtainable below that price. We quote open-hearth rerolling billets at \$54, Philadelphia.

**Plates.**—The Lukens Steel Co. has advanced its price on plates for prompt shipment to 3c., Pittsburgh, and for first quarter to 3.25c., Pittsburgh. However, the company has no sheared plates for delivery short of 10 or 12 weeks, and on universal plates delivery is quoted at four weeks. A Youngstown mill has sold 250 tons of plates for shipment to this district at 2.85c., Pittsburgh. Other sales have been made at 2.75c. or better, and it appears that except for sales by the Carnegie Steel Co. at 2.50c. to the Government and other consumers 2.75c. to 3c., Pittsburgh, is the prevailing range of prices on current transactions. The Lukens Steel Co. plans to operate both of its large mills beginning Jan. 1 and will have a plate output of about 10,000 tons a week. The demand for plates far exceeds the supply, as most makers are out of the market. Sales have been made at 3.25c., Pittsburgh. This price has been quoted by an export company on 5000 tons of plates for England, and on a smaller tonnage sold to Belgium the price was 3c., Pittsburgh. Holland is in the market for ship plates. The demand from Japan has slackened.

The Navy Department will take bids Dec. 19 on 10,000 tons of plates for the League Island Navy Yard. The Pennsylvania Railroad took bids Dec. 10 on 2000 tons of plates for cars and locomotives. The Baldwin Locomotive Works has inquired for about 2000 tons of plates for a prospective foreign order for 55 locomotives. We quote sheared plates, ¼ in. and heavier, at 3.095c. to 3.245c., Philadelphia.

**Structural Material.**—Two Eastern makers of plain material have advanced prices \$2 a ton to 2.55c., Pittsburgh. Notwithstanding these advances the attitude of the manufacturers is to keep prices of structural material in check lest spring building activities be influenced unfavorably. The Pennsylvania Railroad received bids Dec. 10 on 2000 tons of shapes for first half. Shapes have been sold for export at 2.60c., Pittsburgh. We quote plain material at 2.695c. to 2.795c., Philadelphia.

**Bars.**—Steel bars are almost unobtainable except at 3c., Pittsburgh, or higher. Makers of bar iron have again advanced prices \$5 a ton to 3.50c., Pittsburgh. One or two makers are reported to be selling below this price, but the majority of transactions of the past week have been at the higher figure.

**Wire Products.**—Except for small lots of wire nails out of warehouse, very little business is being done. A local warehouse has sold nails at \$8 a keg, base.

**Bolts.**—A local shipyard has placed an order for 1,180,000 fitting-up bolts at slightly below the current market price.

**Old Material.**—Demand for scrap in the East has been light during the past week, but some sales have been made for shipment to the Pittsburgh district at prices higher than can be gotten in this district. We quote for delivery in consumers' yards, eastern Pennsylvania, as follows:

No. 1 heavy melting steel	\$22.50 to \$24.00
Steel rails rerolling	31.00 to 32.00
No. 1 low phosphorus, heavy, 0.04 and under	27.00 to 28.00
Car wheels	30.00 to 31.00
No. 1 railroad wrought	30.00 to 31.00
No. 1 yard wrought	25.00 to 26.00
No. 1 forge fire	17.50 to 18.50
Bundled skeleton	17.50 to 18.50
No. 1 busheling	20.00 to 21.00
No. 2 busheling	16.50 to 17.50
Turnings (short shoveling grade for blast furnace use)	18.00 to 18.50
Mixed borings and turnings (for blast furnace use)	16.00 to 16.50
Machine-shop turnings (for rolling mill and steel works use)	18.50 to 19.00
Heavy axle turnings (or equivalent)	20.00 to 21.00
Cast borings (for rolling mills)	22.00 to 23.00
Cast borings (for chemical plant use)	24.50 to 25.00
No. 1 cast	31.00 to 32.00
Railroad grate bars	26.00 to 27.00
Stove plate	22.50 to 23.50
Railroad malleable	27.00 to 28.00
Wrought iron and soft steel pipes and tubes (new specifications)	22.00 to 23.00
Ungraded pipe	17.00 to 18.00
Iron car axles	45.00 to 46.00
Steel car axles (f.a.s. New York for export)	35.00 to 38.00

## New York

NEW YORK, Dec. 16.

**Pig Iron.**—Consumers find themselves "covered" only when the iron has been actually delivered or is enroute, the existence of a contract having but little effect on actual receipt of iron, so scarce is the supply. There is an especial scarcity of higher silicon iron, the furnaces being more anxious to produce low silicon iron, thereby giving them a greater output. Some sellers do not deny profiteering. Eastern Pennsylvania iron, 2.25 to 2.75 silicon, for spot delivery has sold as high as \$45, furnace, which is about \$4 higher than the market. Buyers are inclined to hesitate to place orders for second quarter, feeling that prices must decline. The inquiry from the railroad supply manufacturer for Bessemer, malleable and charcoal iron, reported last week, has resulted in the sale of 4000 tons for first quarter. As a rule, sellers have no iron to offer for any delivery, and the more fortunate are selling in small lots, 100 tons being maximum. One firm, not



wishing to sell, has raised its price on charcoal iron by \$10 in a week to \$50, furnace.

No. 1 foundry, silicon 2.75 to 3.25....\$42.80 to \$43.80  
No. 2 X, silicon 2.25 to 2.75..... 41.80 to 42.80  
No. 2 plain, silicon 1.75 to 2.25..... 40.80 to 41.80  
No. 2 X, Virginia, silicon 2.25 to 2.75 43.40

**Ferroalloys.**—The domestic market for ferromanganese is quiet but strong at \$120, delivered, at which level sales of small lots for early delivery are reported. Demand, however, is less active than it has been. It is believed also that prior to the second quarter most of the available domestic alloy has been contracted for. So far as can be learned no British alloy is available for delivery earlier than the second quarter. For the second quarter, however, one seller can furnish 1000 tons of standard British alloy for the minimum price of \$120, seaboard. Predictions are freely made that the American as well as the British alloy will sell considerably higher, possibly \$150, before the middle of next year. The spiegeleisen market is quiet but strong at \$39 to \$41, furnace, for early delivery. Domestic demand is at present light, but inquiries for foreign delivery have increased considerably until now they total 10,000 tons. They originate mostly in Holland and at Antwerp, Belgium, and it is believed that considerable of this is destined ultimately for German consumption. Conditions in the spiegeleisen market, in view of the heavy sales made in the last few months, are very strong, as production has not averaged much over 5000 tons per month for most of the year. Offerings of Indian manganese ore have been made at the minimum price of 72c. per unit, seaboard, but this is not attractive to American buyers who, it is believed, would not pay more than 60c. per unit. Ferrosilicon, 50 per cent, is moderately active and strong at \$80 to \$85 per ton, delivered.

**Cast Iron Pipe.**—The newly-established prices are being maintained almost universally. December, usually the dullest month of the year, has so far this year proved to be the most active in 10 years as to volume of sales. Manufacturers are booked with all they can make for two months in 1920. A public letting of 2200 tons of 24-in. pipe and 100 tons of fittings was issued Dec. 16 by Newark, N. J. Private water companies are heavy buyers, as are many manufacturing plants. We quote 6-in. and heavier at \$62.30, New York; 4-in. \$65.30, with \$2 additional for Class A and gas pipe.

**Finished Iron and Steel.**—Fewer mills than last week will entertain orders for any delivery, and consequently prices are ascending on small sales. Large lots are considered by mills only from the standpoint of expediency in caring for old customers and the offerings are pruned down if it is at all possible to entertain the business. It is doubtful if less than 3c. per lb. can be obtained on plates. Of one lot of 1500 tons a leading mill would accept only 500 and took the business at 3c., Pittsburgh. One large buyer who has made commitments at estimates \$4 per ton below the recently ruling market has overstayed, and is having difficulty in placing all the plates required. In bars one well-known consumer has paid 3.85c. plus 0.25c. extra for forging quality on 250 tons for shipment in three months. Any bookings done at prices months ago are only for very much deferred deliveries, in some cases apparently extending into 1921. Belgium has placed orders for 75 locomotives each with the Baldwin and American locomotive companies, with an option to give each 25 more. It is understood that the remainder of the 400 will be built in Germany. About 29 tons of steel is required for each locomotive which will have copper fire boxes. There are promising indications of a very active building campaign in the current lettings of structural steel jobs. The leading interest is sold up for three months, and the letting of work for the spring has only fairly begun. Among the more important buildings contracted for are the following:

First National Bank Building, Boston, 3000 tons, to New England Structural Steel Co.  
Factory building for Farr Alpaca Co., Holyoke, Mass., 375 tons, to American Bridge Co.  
Additions to plant of Willys Corporation, Elizabeth, N. J., 4200 tons, to American Bridge Co.  
Power station for New York Edison Co., 600 tons, to unnamed fabricator.  
Biltmore Country Club, Rye, N. Y., 1300 tons, to the Hedden Iron Construction Co.

Loft building for International Tailoring Co., Fourth Avenue and Twelfth Street, New York, 1300 tons, to Hay Foundry & Iron Works.

Power house for Public Service, Johnstown, Pa., 2000 tons, to American Bridge Co.

Loft building for A. I. Namm & Co., Brooklyn, 900 tons, to the Bethlehem Steel Bridge Corporation.

Boiler house for Pennsylvania Rubber Co., Jeanette, Pa., 600 tons, to an unnamed fabricator.

National Park Bank Building, New York, 1000 tons, to the Harris Structural Steel Co.

Apartment hotel, Philadelphia, 700 tons, to American Bridge Co.

Philadelphia Museum of Art, 900 tons, to American Bridge Co.

Building for D. Ramacciotti, Hagerstown, Md., 160 tons, to Lehigh Structural Steel Co.

A building to have been built at Norfolk, Va., by the Feuerstein Ice & Coal Co., involving 1400 tons, has been withdrawn from the market. The American Locomotive Co. has appropriated \$5,000,000 for plant expansions and machinery to prepare for a large domestic and export demand for locomotives.

We advance prices and quote for mill shipment as follows: Bar iron 3.77c. to 4.77c., according to the schedule already printed in these pages; soft steel bars, 3.27c.; shapes, 2.82c. and plates 3.02c. to 3.27c., all New York.

**Old Material.**—Though the price tendency is upwards, the past week has not seen the marked advance that characterized the last few weeks. Buying is from hand-to-mouth. A call for steel car axles pointed out the scarcity in this commodity, a sale having been made at about \$35, or \$6 higher than the market price a short time before.

Heavy melting steel.....	\$18.50 to \$19.50
Rerolling rails .....	27.00 to 28.00
Relaying rails, nominal.....	47.00 to 48.00
Steel car axles .....	28.00 to 29.00
Iron car axles .....	40.00 to 41.00
No. 1 railroad wrought.....	27.50 to 28.00
Wrought iron track.....	20.00 to 20.50
Forge fire .....	16.00 to 16.50
No. 1 yard wrought, long.....	21.00 to 22.00
Light iron .....	7.00 to 8.00
Cast borings (clean) .....	16.50 to 17.00
Machine-shop turnings .....	14.00 to 14.50
Mixed borings and turnings.....	13.00 to 13.50
Iron and steel pipe (1 in. min. diam., not under 2 ft. long).....	18.50 to 19.00
Stove plate .....	20.50 to 21.00
Locomotive grate bars.....	22.50 to 23.00
Malleable cast (railroad).....	22.50 to 23.00
Old carwheels .....	29.00 to 30.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast.....	\$31.00 to \$32.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	30.00 to 31.00
No. 1 heavy cast, not cupola size.....	24.00 to 25.00
No. 2 cast (radiators, cast boilers, etc.) .....	22.00 to 23.00

## British Prices Advancing

**Molders' Strike Still On—Traffic Conditions Worse With Stagnation Threatened—**

**Pig Iron Probably Higher**

LONDON, ENGLAND, Dec. 15—(By Cable).

An advance in pig iron is believed imminent to cover the rise expected in railroad rates. The traffic position is worse, affecting all industries. Railroads are refusing to accept traffic and stagnation is threatened. The molders' strike is unsettled.

Tin plates are still advancing and are now quoted at about 48s. for the first quarter and 46s. 6d. to 47s. for the second quarter. Galvanized sheets, No. 24 gage, are quoted at £41 to £42 in bundles, f.o.b. works. Thin sheets are hardly obtainable before August, the congestion causing paralysis. There have been advances of £1 5s. in beams, of £1 in rails and of 17s. 6d. in billets.

We quote per gross ton, except when otherwise stated, f.o.b. makers' works, with American equivalents figured at \$3.74 for £1 as follows:

	£	s.	d.	£	s.	d.	
Ship plates .....	21	0	0	23	0	0	\$78.54 to \$86.02
Boiler plates .....	24	0	0	26	0	0	89.76 to 97.24
Tees .....	18	15	0	19	15	0	70.12 to 73.86
Channels .....	18	0	0	19	0	0	67.32 to 71.06
Beams .....	18	15	0	19	5	0	70.12 to 72.00
Round bars, ½ to 3 in. 21 .....	21	5	0	22	5	0	79.47 to 82.21
Rails, 60-lb. and up. 17 .....	17	10	0	17	15	0	65.45 to 66.28
Billets and sheet bars 16 .....	16	7	6	16	10	0	61.22 to 61.71
Steel hoops .....	25	15	0	26	0	0	96.30 to 97.24
Tin plates .....	0	48	0				8.97
Galv. sheets, 24 g. 41 .....	41	0	0	42	0	0	153.34 to 157.08

## IRON AND INDUSTRIAL STOCKS

## Regulations of Fuel and Money Conditions Make for Irregularity

NEW YORK, Dec. 15.

Prices for securities have been irregular during the past week, with the advantage on the down side. In the steel group, Crucible has been the most conspicuous stock because of its wide swings, although trading in Republic has been heavy at times. The market for United States Steel has been comparatively quiet with the tendency of prices downward much of the time notwithstanding the favorable November unfilled tonnage showing.

American and Baldwin Locomotive, General Electric, Worthington Pump and such issues, in most cases, are considerably lower than they were a week ago, due in a large measure to the resumption of Government regulation of fuel consumption. The automobile issues have been subjected to special pressure recently owing, no doubt, to the fact that many manufacturing plants were obliged to close owing to the lack of fuel. General Electric's market action is all the more surprising in view of the fact that the company is shipping goods at the rate of \$20,000,000 per month, thereby beating its war-time record.

The demoralized condition of the foreign exchange market accompanied by reports that no further credits will be extended Europe, together with a tightening of its rediscount rate by the Federal Reserve Bank and a steady drawing down on the amount of funds available for stock market purposes, have not helped general sentiment in financial circles.

American Can, American Car & Foundry and Remington Typewriter are among those issued which have displayed underlying strength of late. The advance in Remington has been due in part to an advance in prices for its product.

Higher prices for the metal and the ending of the coal strike which will allow some of the companies to resume production at an early date have failed to help the copper stocks marketwise.

The tardiness of Congress to provide relief measures for the railroads upon their being turned back to private ownership at the close of the year has been a contributing factor in the market's irregularity during the past week.

The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm. com. 44½	48½	Lackawanna Steel 81½	85
do., pfd. .... 94	96	Lake Sup. Corp. 19¾	22¼
Am. Can. com. .... 50¾	55	Midvale Steel .. 47½	50
do., pfd. .... 98½	100½	Nat-Acme .....	36½ 37¾
Am. Car & Fdry., com. .... 133	139	Natl. Enam. & Strm., com. .... 82¾	87¾
Am. Loco., com. .... 90¾	94½	N. Y. Air Brake. 108	111¾
Am. Ship. com. .... 115	116	Nova Scotia Steel 69¾	73
Am. Steel Fdries, com. .... 41¼	44¾	Press. Steel, com. 95	99
do., pfd. .... 92	92	do., pfd. .... 101	101
Bald. Loco., com. 100½	106¾	Ry. St. Spg., com. 94¾	97¾
do., pfd. .... 101	102	Replodge Steel... 50	53¾
Beth. Steel, com. 86¾	89¾	Republic, com. .... 101½	106½
do., class B. .... 88¾	94	do., pfd. .... 105	106½
do., pfd. .... 110	113	Sloss, com. .... 68½	71½
Case, J. I., pfd. .... 97¾	99½	do., pfd. .... 94	94
Chic. Pneu. Tool. 107	108	Superior Steel .. 43½	44
Colo. Fuel .....	37 40½	Transue-Williams 60¾	62
Cruc. Steel, com. 192	210	U. S. Alloy Steel 49	50¾
do., pfd. .... 99	100½	U. S. Pipe, com. ... 20½	21½
Deere & Co., pfd. 99¾	100	do., pfd. .... 54½	57
Gen. Electric .... 166	166¾	U. S. Steel, com. 100¾	104
Gt. No. Ore Cert. 36	38¾	do., pfd. .... 112½	114
Gulf States Steel. 63½	69¾	Van. Steel .....	55 61½
do., 1st pfd. .... 92½	92½	Va. I. C. & Coke. .... 74	
Int. Har., com. .... 126¾	131½	West'gh'se. Elec. 52	54¾
do., pfd. .... 114	115¾		

## Dividends

The Allis-Chalmers Mfg. Co., quarterly, 1% per cent on the preferred and extra 1% per cent on account of accumulated dividends, payable Jan. 15.

The American Car & Foundry Co., quarterly, 3 per cent on the common and 1% per cent on the preferred, payable Jan. 1.

The American Steel Foundries, quarterly, 75c. on the common, payable Jan. 15, and 1% per cent on the preferred, payable Dec. 31.

The Canadian Crocker-Wheeler Co., quarterly, 1% per cent on the common and preferred stocks, payable Dec. 31.

The Dominion Iron & Steel Co., quarterly, 1% per cent on the preferred, payable Jan. 1.

The Ingersoll-Rand Co., 3 per cent, payable Jan. 2.

## Industrial Finances

The United States Supreme Court has set Jan. 5 as the date for argument in the cases of the Carbon Steel Co., the Forged Steel Wheel Co. and Worth Bros. Co., involving the question as to whether these companies were makers of shells and munitions of war within the meaning of the munitions manufacturers tax act of 1916.

Stockholders of the Studebaker Corporation have ratified the plan to increase the capitalization from \$45,000,000 to \$90,000,000, by an issue of common stock.

The Boston Belting Co. has asked permission of Massachusetts to increase its capital stock from 10,000 to 15,300 shares, so that there will be outstanding 10,300 shares of preferred stock, par \$50, and 5000 shares of common, par \$100.

The stockholders of Fairbanks, Morse & Co. have approved an increase in the common stock from 25,000 shares, par \$100, to 325,000 shares, no par. Of the new shares, 250,000 will be allotted to the shareholders in exchange for their present holdings, part of the remainder will be sold to officers and employees, and the balance reserved for financing manufacturing extensions.

The Hobbs Lock Washer Co., Worcester, Mass., has applied under the laws of that state for incorporation with capital stock of \$50,000 to manufacture lock washers. The location of the plant has not yet been determined. The president of the new company is Samuel T. Hobbs, for the past five years sales manager of the lock washer department of the Hobbs Mfg. Co.

The Black Rock Works of the Bethlehem Shipbuilding Corporation, Ltd., at Buffalo, having completed its contracts, is about to be turned over to the Government. Announcement is made by the company that any material ordered for delivery on Government contracts is no longer required and will not be accepted.

The Frederick Engineering Co., 61 Broadway, New York, with works at Frederick, Md., has been incorporated for the manufacture of automatic stokers, steam jet ash conveyors and centrifugal pumps. Officers of the new company are: President, W. A. Riddell, president Frederick Iron & Steel Co.; vice-president and sales manager, Harold P. Childs, formerly of the Westinghouse Machine Co.; vice-president and chief engineer, Edwin Lundgren, formerly chief engineer stoker department Westinghouse Machine Co. and consulting engineer Westinghouse Electric & Mfg. Co.; secretary and treasurer, E. J. Bell.

Jones Brothers, Ravenna, Ohio, a partnership, will be taken over by the recently incorporated Jones Brothers Structural Steel Co. Improvements are to be made in the structural steel plant. Officers of the new corporation are: J. A. Jones, formerly of the Alliance Structural Steel Co., president; G. G. Jones, formerly of the Penn Bridge Co., vice-president, and B. F. Jones, secretary.

The Vanadium Corporation of America announces that all communications and invoices should be addressed to Bridgeville, Pa., and not to Pittsburgh, as the corporation has no general offices in Pittsburgh.

All assets, liabilities and contracts of the Passaic Structural Steel Co., Paterson, N. J., have been transferred to the Paterson Bridge Co., which will conduct business in the future.

The Superior Steel Corporation, Pittsburgh, for the six months ended June 30, 1919, shows a surplus after preferred dividends equal to \$2.51 a share on the common stock.

Controlling stockholders of Flint & Chester, Inc. New York, have purchased a controlling interest in Charles D. Durkee & Co., 2 South Street, New York, manufacturer and dealer in marine hardware, with factory at Grasmere, Staten Island. The companies will be operated under their corporate names at 2 South Street, New York.



# Prices Finished Iron and Steel, f.o.b. Pittsburgh

(Prices quoted below represent as closely as they can be given those charged by mills to their regular trade for indefinite shipment. Owing to practical famine in supply of finished steel products and the heavy demand existing, tenders of new business are being made to the mills by jobbers and consumers at higher prices than those quoted below, but as a rule the mills are turning this offered business away.)

Freight rates from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, with revisions effective Nov. 1, 1918, in carloads, to points named, per 100 lb. are as follows: New York, 27c.; Philadelphia, 24.5c.; Boston, 30c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49.5c.; Denver, 99c.; Omaha, 59c.; minimum carload, 80,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, \$1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.315, minimum carload, 40,000 lb.; and \$1.25, minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. Jacksonville, Fla., all rail, car lots, 41.5c.; less, 59c.; rail and water, car lots, 34.5c.; less, 46.5c. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

## Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 2.45c.

## Wire Products

Wire nails, \$4.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.50, and shorter than 1 in., \$2.00. Bright basic wire, \$3.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barbed wire and fence staples, \$4.45; painted barbed wire, \$3.75; polished fence staples, \$4.50; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent off for small lots, f.o.b. Pittsburgh.

## Bolts, Nuts and Rivets

Large structural and ship rivets, \$4.10 base  
Large boiler rivets, \$4.20 base  
Small rivets, 1/4 in., 5/16 in. and 7/16 in. diameter, 50 per cent off list

Machine bolts, hp. nuts, 3/4 in. x 4 in.:  
Smaller and shorter, rolled threads, 50 and 10 per cent off list  
Cut threads, 50 per cent off list  
Larger and longer sizes, 40 and 5 per cent off list  
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.:  
Smaller and shorter, 40 and 5 per cent off list  
Larger and longer, 35 and 5 per cent off list  
Carriage bolts, 3/4 in. x 6 in.:  
Smaller and shorter, rolled threads, 45 and 5 per cent off list  
Cut threads, 40 and 5 per cent off list  
Larger and longer sizes, 30 and 10 per cent off list  
Lag bolts, 50 and 10 per cent off list  
Plow bolts, Nos. 1, 2 and 3, 50 per cent off list  
Plow bolts, Nos. 4 to 10, 50 plus 20 per cent off list  
Hot pressed nuts, sq. blank, 2.50c. per lb. off list  
Hot pressed nuts, hex. blank, 2.50c. per lb. off list  
Hot pressed nuts, sq. tapped, 2.25c. per lb. off list  
Hot pressed nuts, hex. tapped, 2.25c. per lb. off list  
C.p.c. and t. sq. and hex. nuts, blank, 2.50c. per lb. off list  
C.p.c. and t. sq. and hex. nuts, tapped, 2.25c. per lb. off list  
Semi-finished hex. nuts:  
3/4 in. and larger, 65 per cent off list  
9/16 in. and smaller, 70 and 10 per cent off list  
Stove bolts in packages, 75-10 per cent off list  
Stove bolts in bulk, 75-10-2 1/4 per cent off list  
Tire bolts, 60-10 per cent off list  
The above discounts are from Nov. 1, 1919.  
All prices carry standard extras, Pittsburgh basis.

## Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$60 to \$65; chain rods, \$65 to \$70; screw rivet and bolt rods and other rods of that character, \$65 to \$70. Prices on high carbon rods are irregular. They range from \$75 to \$100, depending on carbons.

## Railroad Spikes and Track Bolts

Railroad spikes, 1/2 in., 9/16 in. and larger, \$3.35 per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 3/4 in., 7/16 in. and smaller, \$3.85 to \$4 per 100 lb. in lots of 200 kegs of 200 lb. each or more; track bolts, \$4.35 to \$4.50 per 100 lb. in carload lots of 200 kegs or more, with the usual extras for small lots. Boat and barge spikes, \$3.85 to \$4 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh.

## Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$13.80 per package; 8-lb. coating, I. C., \$14.10; 12-lb. coating, I. C., \$15.80; 15-lb. coating, I. C., \$16.80; 20-lb. coating, I. C., \$18.05; 25-lb. coating, I. C., \$19.30; 30-lb. coating, I. C., \$20.30; 35-lb. coating, I. C., \$21.30; 40-lb. coating, I. C., \$22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

## Iron and Steel Bars

Steel bars at 2.75c. from mill. Bar iron 3.25c.

## Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			
Steel		Iron	
Inches	Black Galv.	Inches	Black Galv.
1 1/8, 1/4 and 3/8	50 1/2 24	1 1/8 and 1/4	29 1/2 2 1/2
1/2	54 1/2 40	3/8	30 1/2 3 1/2
3/4 to 3	57 1/2 44	1/2	34 1/2 16 1/2
		3/4 to 1 1/2	30 23 1/2
Lap Weld			
2	50 1/2 38		24 1/2 9 1/2
2 1/2 to 6	53 1/2 41		31 1/2 17 1/2
7 to 12	50 1/2 37		32 1/2 18 1/2
13 and 14	41		34 1/2 21 1/2
15	38 1/2		31 1/2 18 1/2
Butt Weld, extra strong, plain ends			
1 1/8, 1/4 and 3/8	46 1/2 29	1 1/8, 1/4 and 3/8	28 1/2 11 1/2
1/2	51 1/2 39	3/8	32 1/2 20 1/2
3/4 to 1 1/2	55 1/2 43	1/2 to 1 1/2	39 1/2 24 1/2
2 to 3	56 1/2 44		
Lap Weld, extra strong, plain ends			
2	48 1/2 37	1 1/8	25 1/2 10 1/2
2 1/2 to 4	51 1/2 40	1 1/2	31 1/2 17 1/2
4 1/2 to 6	50 1/2 39	2	33 1/2 20 1/2
7 to 8	46 1/2 33	2 1/2 to 4	25 23 1/2
9 to 12	41 1/2 28	4 1/2 to 6	34 1/2 22 1/2
		7 to 8	26 1/2 14
		9 to 12	21 1/2 9 1/2

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipe have been nine (9) points lower (higher price).

## Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh:

Lap Welded Steel	Charcoal Iron
3 1/2 to 4 1/2 in. 40 1/2	3 1/2 to 4 1/2 in. -16
2 1/2 to 3 1/2 in. 30 1/2	3 to 3 1/2 in. -1 1/2
2 1/4 in. 24	2 1/2 to 2 3/4 in. +1
1 3/4 to 2 in. 19 1/2	2 to 2 1/4 in. +10
	1 1/2 to 1 3/4 in. +20

## Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton	Per Net Ton
1 in. \$327	1 1/4 in. \$207
1 1/4 in. 267	2 to 2 1/4 in. 177
1 3/4 in. 257	2 1/2 to 3 1/4 in. 167
1 1/2 in. 207	4 in. 187
	4 1/2 to 5 in. 207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiations.

## Sheets

Makers' prices for mill shipments on sheets of United States standard gage in carload and larger lots are as follows:

### Blue Annealed—Bessemer

	Cents per lb.
No. 8 and heavier	3.50
Nos. 9 and 10 (base)	3.55
Nos. 11 and 12	3.60
Nos. 13 and 14	3.65
Nos. 15 and 16	3.75

### Box Annealed, One Pass Cold Rolled—Bessemer

Nos. 17 to 21	4.15
Nos. 22 to 24	4.20
Nos. 25 and 26	4.25
No. 27	4.30
No. 28 (base)	4.35
No. 29	4.45
No. 30	4.55

### Galvanized, Black Sheet Gage—Bessemer

Nos. 10 and 11	4.70
Nos. 12 to 14	4.80
Nos. 15 and 16	4.95
Nos. 17 to 21	5.10
Nos. 22 to 24	5.25
Nos. 25 and 26	5.40
No. 27	5.55
No. 28 (base)	5.70
No. 29	5.95
No. 30	6.20

### Tin-Mill Black Plate Bessemer

Nos. 15 and 16	4.15
Nos. 17 to 21	4.20
Nos. 22 to 24	4.25
Nos. 25 to 27	4.30
No. 28 (base)	4.35
No. 29	4.40
No. 30	4.45
Nos. 30 1/2 and 31	4.45

## Non-Ferrous Metals

### The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin, New York		Lead		Spelter	
Lake	Electro- lytic			New York	St. Louis	New York	St. Louis
Dec. 10	19.00	18.50	53.75	7.00	6.75	8.75	8.40
11	19.00	18.50	53.37½	7.10	6.85	8.70	8.35
12	19.00	18.50	52.87½	7.15	6.90	8.65	8.30
13	19.00	18.50	53.62½	7.15	6.90	8.60	8.25
15	19.25	18.75	53.62½	7.15	6.90	8.60	8.25
16	19.25	18.87½	53.50	7.15	6.90	8.60	8.25

NEW YORK, Dec. 16.

The markets have been moderately active and are strong. Exchange values have been a prominent factor in most of them. Copper is again more active and advancing. The tin market fluctuates with the changes in sterling exchange. The tone of the lead market is very strong and prices are higher with supplies scarce. Conditions in the zinc market are also largely controlled by the fluctuations in sterling exchange, but the undertone is very firm. Antimony is slightly higher.

### New York

**Copper.**—A very good business is reported to have been done in the last two weeks or so and especially the last day or so. The market, after having been fairly steady at 18.50c., New York, for electrolytic copper for December and January delivery, has advanced slightly until to-day sales have been made at 18.87½c. to 19c., New York, or 19.12½c. to 19.25c., delivered. Lake copper is also stronger with some sellers out of the market. It is more or less nominal at 19.25c. to 19.37½c., New York, for December and January delivery. Demand for domestic consumption is better than it has been for some time. The two principal foreign buyers are Japan and England, the former again becoming an active purchaser in this market. Because of conditions in exchange values Germany and other European countries are not yet active buyers.

**Tin.**—The market has been quiet, but some business has been done each day, mostly at falling prices, due to the weakness in sterling exchange. In fact, the value of the English pound is the controlling factor in this market, for as this rises or falls the price of tin, particularly spot Straits, changes sympathetically. After falling to 52.87½c. on Dec. 12, spot Straits again advanced until early this week it was selling about three-quarters of a cent higher. There is a wide difference in the policy of the various dealers in the New York tin market, some freely making sales at ruling prices, while others are more conservative. There is, however, a widespread desire to sell tin, but buyers are often frightened because of the fluctuations in sterling exchange. So far this week demand has been less active, due to the fact that the London market has advanced as well as sterling exchange, so that prices here are also higher and buyers have consequently held off. Arrivals of tin for the month to date have been 3883 tons of which 1090 tons has come in through Pacific ports. The quantity afloat is reported as 3950 tons. The London market yesterday was £315 10s. for spot Straits.

**Lead.**—The market is very strong, due largely to scarcity of the metal. On Dec. 12 the leading interest again advanced its price 10 points to 7c., New York, or 6.75c. St. Louis, but the outside market had already reached this level previously. It is reported that the leading interest is not actively selling and as a result the quotable values are made by outside sellers. Due to the scarcity of lead and a good demand prices in the outside market are higher than that of the leading interest. We quote values at 7.15c., New York, or 6.90c., St. Louis, for early delivery.

**Zinc.**—This market is largely influenced by the value of sterling exchange because foreign demand is more

of a controlling factor than domestic buying. Producers are comfortably sold up well into the first quarter and are therefore not anxious to sell. Due to lower values of the pound sterling quotations for zinc have fallen until to-day prime Western for early delivery for December and first quarter is quoted at 8.25c., St. Louis, and 8.60c., New York. An idea of the extent of the British demand for zinc in this market is conveyed by the statement that in the last few months that country has taken from 10,000 to 12,000 tons each month. The market is strong and conditions are generally considered bullish.

**Antimony.**—This market is quiet, with wholesale lots for early delivery quoted at 9.62½c., duty paid, New York.

**Aluminum.**—Virgin metal, 98 to 99 per cent pure, is quoted at 32c. to 33c., New York, for wholesale lots for early delivery.

**Old Metals.**—The market is firm. Dealers' selling prices are reported as follows:

	Cents per lb.
Copper, heavy and crucible	19.00
Copper, heavy and wire	18.00
Copper, light and bottoms	16.00
Brass heavy	13.00
Brass light	9.00
Heavy machine composition	18.00
No. 1 yellow rod brass turnings	11.00
No. 1 red brass or composition turnings	15.00
Lead, heavy	6.00
Lead, tea	4.50
Zinc	5.50

### St. Louis

ST LOUIS, Dec. 15.—Non-ferrous markets have been quiet but firm. Lead in car lots is quoted at 6.80c. and spelter at 8.40c. In less than car lots the quotations are: Lead, 7.37½c.; spelter, 8.75c.; tin, 60c.; copper, 21c.; antimony, 10.50c. In the Joplin district ore has been firmer as a result of the settlement of the coal strike and the renewed prospect of getting fuel for mine and smelter operations. On miscellaneous scrap metals, we quote dealers buying prices as follows: Light brass, 8c.; light copper, 13c.; heavy yellow brass, 10c.; heavy copper and copper wire, 16c.; zinc, 4c.; lead, 4.50c.; pewter, 35c.; tinfoil, 43c.; tea lead, 3c.; aluminum, 22c.

### Monthly Dinners of the Detroit Range Boiler & Steel Barrel Co.

The Detroit Range, Boiler & Steel Barrel Co. has inaugurated a monthly get-together party of the 25 department heads, and a regular monthly dinner will be held. The company operates its own cafeteria, which is used for such meetings, at which discussion is opened on all new ideas that would tend to improve working conditions and facilitate increased production throughout the plant.

The first meeting, Nov. 15, decided that in the future every department head would make written recommendations for the good of the factory and the men working in it, and present them at the various meetings, when they would be read and amended and acted upon in the way the managers as a body see fit. An officer of the company says:

"This is believed to be the first stepping stone to overcoming the obstacles which face both the manufacturer and the working man, and is considered the most logical means of bringing about complete understanding between these two factions for their mutual good. It is a very good stimulant to good fellowship and camaraderie, which is the thing that should exist in all industrial organizations, since having working men in sympathy with the ideals and purposes of that organization is of vital importance and most desirable."

It developed at the first department dinner that many heads of departments in this plant have long been connected with the organization, some for as long as 25 years, others for 22 and 20 years, and a great many for 10 years and over, and have worked their way into good positions through loyalty and by co-ordinating with the executive end.

This company has been remarkably free from labor troubles of any kind.



## Steel Almost Unobtainable in the Youngstown District

YOUNGSTOWN, OHIO, Dec. 16.—With tonnage output reduced to a minimum, there is almost no steel to be obtained in the Mahoning valley, this applying to all finished and semi-finished lines. Sheet bars have virtually disappeared and are quoted at \$51. Recent sales of slabs brought \$48, mill. Producers are taking advantage of the opportunity to clean up off-grade pig iron and one maker has disposed of 16,000 tons in the last two weeks. Some production of this character, caused by irregular blowing, due to the strike and the subsequent fuel shortage, is still available.

The oil country continues to send inquiries for tubular products, while large tin consumers, including can and container manufacturers, are seeking their next season's requirements. Fabricators, whose stocks were largely depleted during the suspension caused by the strike, are eager for steel. Auto manufacturers are offering premiums of \$14 and \$15 for sheets.

There is, of course, no spot business. District mills are still engaged filling fourth-quarter bookings and none have yet commenced to roll 1920 orders. First quarter orders are certain to be delayed. Wire mills have all the business they can handle. District plate mills are well booked over the first quarter.

### Employers' Ranks Broken

SAN FRANCISCO, Dec. 9.—The solidarity of the opposition of the employers to paying the demands of the workmen in the shipyards, shops and foundries has apparently been broken in a breach reported between the Metal Trades Association and the Foundrymen's Association. It appears there is a difference of construction put upon the agreement between the two associations, and the Foundrymen are reported to have withdrawn from the alliance. So far this has resulted in the reopening of none of the foundries on a union basis, but it is intimated that a number of the smaller foundries are planning to start upon the closed shop basis and that some of the small machine shops may also resume work on the same basis. With the shipyards, the larger shops and larger foundries there is no apparent weakening from their former declaration that they would continue to run as open shops. In the meantime the strike leaders declare that they have won and that all will soon be on the closed shop basis or will not be running. There is no doubt that the shipyards are now running on the open shop basis, as are some of the large shops closely affiliated with the yards. So far, however, no foundry has opened except a few small ones which are paying the scale demanded by the union.

### Electrical Apparatus for Export

The Westinghouse Electric & Mfg. Co., East Pittsburgh, recently made a shipment of 17 carloads of electric equipment for installation in the Imperial Steel Works at Tokio, Japan. Part of this equipment is to replace a steam engine now driving a 40-in. reversing mill for this company. After this electric equipment has been installed, this blooming mill will be capable of rolling steel ingots measuring 500 x 500 mm. and weighing 3000 kg. normal, or 5000 kg. maximum. The capacity will be 50 tons per hr.

The mill will be operated by a 3500-hp. single-unit motor, of the reversing blooming mill type, taking direct-current at 600 volts and operating with a speed range of 0 to 100 r.p.m. To supply power to the motor a flywheel motor-generator set is being furnished. The generator is of 2800 kw. capacity, 600 volts, d.c., 368 r.p.m. It will be connected in series with the reversing motor and is designed to stand the same momentary current peaks as the reversing motor.

The generator is driven by a 2500-hp., 8-pole alternating-current motor of the wound rotor induction type taking power at 3400 volts, 3-phase, 25-cycles and operating at a speed of 368 r.p.m. A slip regulator is used to control this set. A notable feature of the motor-generator set is a 75,000-lb. cast-steel flywheel measuring 14 ft. 9 in. in diameter. For field excitation, there is being furnished a motor-driven exciter

set consisting of one 32½-kw. 125-volt constant potential exciter, one 12½-kw. 125-volt variable potential exciter and a 70-hp. 3-phase, 25-cycle, 200-volt driving motor, all direct-connected and mounted on a common bed plate.

Accessories used with the foregoing equipment are a Sirocco blower driven by a 40-hp. 3-phase, 25-cycle, 220-volt squirrel cage induction motor, an air washer to be used in connection with the blower, and a 125 k.v.a. 3400-220 volt, 3-phase, 25-cycle transformer connected high voltage side in star, and low voltage side in delta, to supply power for the exciter set and blower motor. Another part of the shipment comprises switchboard panels containing instruments, switches, circuit breakers, shunts and relays for the control of the motors, generators, and feeders. Additional equipment includes disconnecting switches, oil circuit breakers, and current transformers to be mounted on pipe framing.

### Report of Minerals Relief Commission

WASHINGTON, Dec. 16.—The War Minerals Relief Commission created by Congress last summer to adjust claims for losses sustained by war-time producers of manganese, chrome, pyrites and tungsten has made its first report to Congress. Out of 1203 claims for a total of \$16,655,481, it has ordered the disallowance of 442 claims totalling \$1,946,374. On only 30 claims has an award been made, and on these out of \$1,399,112 claimed, it has awarded \$418,502. At the same time, the commission has succeeded in spending \$147,431 in its work, so that it has \$7,934,065 left out of the original appropriation for claims and expenses of \$8,500,000. Many of the rejected claims were based on general efforts to produce these war minerals, but the commission, backed by an opinion of the Attorney General, ruled that only such claims could be considered as were based on an actual request from the Department of the Interior, the War Industries Board, the War Trade Board, the Shipping Board or the Emergency Fleet Corporation "to produce or to prepare to produce one of the four named minerals."

The Attorney General also gave the commission a ruling that producers of ferromanganese did not come under the classes of claimants contemplated by Congress. The chief claim affected by this ruling was that of the Anaconda Mining Co. for \$561,346.

### Substituting Oil for Coal in Britain

LONDON, ENGLAND, Nov. 28.—Upset conditions in the coal industry in Great Britain are causing more and more interest in the substitution of oil fuel for coal, says the American Chamber of Commerce in London. It is admitted that ships that went out for raw material would not be carrying the coal cargoes of the past, and would therefore make the outbound voyage partly empty; the goods coming back would have to pay double freights. There would no longer be the export of coal to pay for the raw materials imported. The trend is illustrated by the conversion of two of Britain's greatest liners to oil burners. Both the Olympic of the White Star Line and the Cunarder Aquitania are being reconditioned and fitted with oil burners. Greater efficiency is expected and the engine-room personnel will be reduced perhaps from 350 to 40 or 50.

### German Trade With Switzerland

The German domination of Swiss imports of iron and steel is strikingly revealed by a series of statistics compiled by the Bureau of Foreign and Domestic Commerce from official Swiss sources. The German share of these imports in every year from 1913 to 1918, inclusive, has been a controlling one. This Swiss trade with Germany has been maintained throughout the war, although in lessened volume and with enhanced prices. In 1913, the last year of normal trade, imports of this class of goods from Germany by quantity were over 50 per cent and by value over 68 per cent of the total imports of iron and manufactures thereof from all countries; and in 1918 over 68 per cent and 69 per cent, respectively.

## PERSONAL

James E. McDonald has been appointed resident editor at Cincinnati of *THE IRON AGE*, succeeding Mr. Smith. Mr. McDonald comes to this journal with ten years' experience in newspaper work, chiefly at Sydney, Nova Scotia, and five years mechanical experience in machine shop work, and since the war has been steel inspector for Robert W. Hunt & Co. On leaving the newspaper field, he joined the Dominion Bridge Co. at Montreal as a mechanic and became foreman of the shell shop of that company, from which position he gained appointment as superintendent of Lymburner, Ltd., Montreal, manufacturer of shells, where for two years, until the armistice was signed, he had supervision of a plant employing over 1800 persons, including tool room, machine shop and electrical departments, and had charge of the building of about 200 machines of various types. For the last nine months he has been most of the time inspecting steel at the works of the Algoma Steel Corporation at Sault Ste. Marie, Ont.

Charles L. Smith, after some ten years' connection with *THE IRON AGE* in the editorial department, most of that time as resident editor at Cincinnati, has resigned to become district manager of the Vanadium Alloys Steel Co., with headquarters in Cincinnati. The host of friends he has gained for himself in the iron, steel and machinery trades will undoubtedly prove a great asset to him in his new connection and he has the best wishes of *THE IRON AGE*.

S. A. Benner has resigned as vice-president of the Federal Export Corporation, New York. Wayne Bogue, who was a member of his staff, has joined the exporting firm of W. R. Grace & Co., New York.

Guy Bayley, vice-president Federal Export Corporation, New York, has arrived in Argentina on a trip in the interest of his company.

L. R. Carter of the Australian selling organization of the Gillespie Brothers & Co., 11 Broadway, New York, with A. G. Ruthven of Reid & Gregory, a client of the New York firm in Sydney, Australia, are now in New York and will remain there for six to eight weeks. Their purpose in visiting America is to obtain exclusive agencies for the products of American manufacturers including hardware, aluminum goods, enameled ware and other lines, which might be salable in Australia.

Samuel Stoneham, general superintendent Union Steel Casting Co., Boston, has resigned, and the duties of that office are being discharged for the present by A. F. S. Blackwood, vice-president.

Robert Kimber, formerly representing Firth Sterling Steel Co. in its Hudson River, Brooklyn and Long Island territory, has been appointed eastern sales representative of Le Moyne Steel Co., offices at 30 Church Street, New York.

John H. Allison has joined the sales engineering department of the Celite Products Co., producer of insulating products, in the Pittsburgh district.

Frank J. Herman has been appointed manager of the New York office of Pilling & Crane, 71 Broadway. Mr. Herman was formerly with the firm's Philadelphia office. He was in charge of coke for the Fuel Administration during the war. For several years he was associated with W. J. Rainey.

William T. Hildrup, secretary-treasurer and general manager Harrisburg Pipe and Pipe Bending Co., Harrisburg, Pa., with his wife, will go to Italy during the spring for a visit with Mrs. Hildrup's sister, Countess Bochi Bianchi.

Henry Buker, sales manager Brown & Sharpe Mfg. Co., Providence, R. I., recently returned from a business trip abroad.

Louis J. Krom, managing editor of the *Metal Industry*, New York, for the last 11 years, has become works manager of the new rolling mill of the West

Virginia Metal Products Corporation, Fairmount, W. Va. Adolph Bregman, a graduate of the Colorado School of Mines, has been appointed as managing editor. Mr. Krom will continue as rolling mill editor of the paper. He is the author of several books on non-ferrous subjects.

Ormond E. Hunt, chief engineer of the passenger car division of the Packard Motor Car Co., Detroit, has resigned to become vice-president of the Mercer Motors Co., Trenton, N. J. Mr. Hunt will be in charge of all engineering and manufacturing.

H. M. Ward, fabricating engineer for the Carolina Shipbuilding Corporation, Wilmington, N. C., has resigned, to accept an official position with the Hedden Iron Construction Co., Newark, N. J. He will be located at the New York offices, 30 Church Street.

B. L. Weaver, superintendent Vulcan Iron Works, Wilkes-Barre, Pa., delivered an illustrated lecture on "Cast Steel" at a recent meeting of the Engineering Society of York, Pa. Mr. Weaver's talk bore principally on the design of steel castings and the methods of making them.

Joseph O. Proctor, Jr., has been elected trustee of the Ames Plow Co., Boston. A dividend of 25 per cent has been ordered paid to creditors on or before Dec. 19.

Robert Grant, head of Robert Grant, Woolworth Building, New York, iron and steel merchant, has returned from a business trip to England.

Robert E. Lee, Baltimore, Md., has been appointed chairman of the State Industrial Accident Commission by Governor Harrington to succeed Charles D. Wagaman, resigned.

H. H. Huyett was re-elected president of the Reading Car Wheel Co., Reading, Pa., at the annual meeting of the stockholders. Other officers re-elected are: W. C. Mullet, secretary and treasurer; and John B. Bowers, general manager.

C. H. Haynes, traffic manager of the Brier Hill Steel Co., Youngstown, Ohio, is recuperating at Lake Wawasee, Ind., from an attack of illness suffered on a recent trip to Chicago.

H. W. Bleakley, formerly of the Remington Arms Co. plant at Hoboken, N. J., has assumed his new duties as works manager of the Savage Arms Co., Sharon, Pa. John Keefer, Bridgeport, Conn., has been named chief clerk, succeeding F. E. Worthy, who resigned to become assistant secretary and treasurer of the Standard Tank Co., Sharon. O. H. Fish has been transferred from works manager of the Philadelphia, Pa., plant of the Savage Arms Co. to take charge of the pressed steel department at Sharon. R. W. Gilmore, in charge of the die shop, has been made superintendent of the forge and die shop, succeeding George Hunt, resigned. Joseph Coogan resigned as head of the pressed steel department.

Dan C. Swander, vice-president and director of sales of the Standard Parts Co., Cleveland, has become assistant general manager. The appointment means increased assistance to President Christian Girl.

William A. Smith, formerly assistant manager Russell Motor Axle Co., Detroit, is now president and general manager of the Detroit Hexagon Drill Co.

L. W. Spring, chief chemist and metallurgist, Crane Co., Chicago, delivered an address, illustrated by stereopticon slides, before the Chicago Foundrymen's Club, at the City Club, Chicago, on Dec. 13. His subject was the "Metallurgy of Iron and Steel and Their Industrial Uses."

A. C. Cook, who has been at the head of the sales organization, became general sales manager on the reorganization of the sales department of the Warner & Swasey Co., Cleveland, on Dec. 1. Associated with him in the former sales organization were L. E. Berry, who has become domestic sales manager, and Charles L. Stilwell, who has become foreign sales manager. There was no change in personnel.

George D. Farnham, formerly power and heating engineer for the Westinghouse-Church-Kerr Co., New York, has become connected with the McCann-Harrison



Co., Cleveland, as chief engineer of its power and heating department, and J. J. Scales, formerly chief engineer of the American Shop Equipment Co., has become chief engineer of its industrial furnace department.

E. W. McCullough has resigned as secretary and general manager of the National Implement and Vehicle Association, with headquarters at Chicago. H. J. Sameit has been appointed acting secretary.

Charles Mourse, who has been in charge of the Heald Machine Co., Worcester, Mass., engineering department, has accepted a position with the Lombard Machine Co. Victor Bergstrom takes his place in the Heald organization.

Arthur Palmer spoke on "Modern Photography," at the Park Club, Pittsfield, Mass., Dec. 6, under the auspices of the Institute of Electrical Engineers. Mr. Palmer is with the transformer engineering department of the General Electric Co.

Howard M. Davis, superintendent of the sheet mills at the Gary, Ind., plant of the American Sheet & Tinplate Co., has resigned, effective Jan. 1, to become general superintendent of the Newport Rolling Mill Co., Newport, Ky. He went to Gary nine years ago from Scottdale, Pa., where he was manager of two plants. He is a member of the city council of Gary.

E. A. Schurk, secretary and treasurer the American Instrument Works, 18 East Lacock Street, Pittsburgh, will leave shortly for abroad in connection with export trade.

L. Sevier, vice-president Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., resigned, effective Dec. 15, to become president of the Alabama Manufacturers' Association, which seeks to extend Alabama's trade territory in manufactured products.

Don F. Kennedy, manufacturers' agent, Detroit, for the past four years district sales manager of the Hammond Steel Co., Inc., Syracuse, N. Y., has taken the agency for Michigan and Toledo of the Towmotor Co., of Cleveland, manufacturer of gasoline industrial tractors for use in and about manufacturing plants.

Arthur G. Jackson, general superintendent and secretary and treasurer of the Miller Lock Co., Philadelphia, will leave for Germany about the middle of February to help for some months in the care of children in Germany under a plan arranged by an association of Quakers.

J. J. Turner of the Pennsylvania Lines West has been elected a director of the Pittsburgh Rolls Corporation, Pittsburgh.

J. H. Creighton has been elected secretary and treasurer of the Monongahela Iron & Steel Co., Pittsburgh, succeeding George B. Meanor, Jr., who retired from the company to go into the laboratory supply business at Birmingham, Ala.

Raymond Fisher, for several years chief civil engineer of the plant of the Pittsburgh Crucible Steel Co., Midland, Pa., recently resigned to accept a position with the H. W. Johns-Manville Co.

J. Ramsey Speer has resigned as president to become chairman of the board of the Pittsburgh Iron & Steel Foundries Co., and Charles McKnight has been elected president to succeed Mr. Speer and will also continue as treasurer. J. McK. Speer and C. V. Blue, Jr., are vice-presidents and H. V. Blaxter, secretary of the company.

James H. Grose, recently appointed general superintendent of the Youngstown district of the Carnegie Steel Co., will on Jan. 27, become president of the Brier Hill Steel Co., succeeding W. A. Thomas, retired. For four years previous to his appointment as general superintendent, Mr. Grose was in charge of the Youngstown works of the Carnegie Steel Co., and it was in that city 30 years ago that he began his industrial career with the Morse Bridge Co., where he learned bridge engineering.

## OBITUARY

MYER M. KANN, for several years secretary and treasurer of the Pittsburgh Crushed Steel Co., died at his home in that city on Wednesday, Dec. 10. Mr. Kann was also president of Harrison Brothers Co., Inc., Amesbury, Mass., and a director of the Specialty Device Co., Cincinnati, and of the National Abrasive Co., Boston. He was born in Pittsburgh in 1857, and spent his entire lifetime there. He was a member of the American Foundrymen's Association, the American Society of Mining Engineers, the Pittsburgh Chamber of Commerce and several Jewish charitable and philanthropic organizations.

WILLIAM HENRY HART, founder and for 50 years president of the Stanley Rule & Level Co., New Britain, Conn., died at his home in that city Dec. 14 at the age of 84. He retired from active business a year ago. He was born in New Britain and was director of the New Britain National Bank, a director of Peck & Bros. and of the Savings Bank of New Britain. He was a member of the Hardware Club of Manhattan.

HARRY D. COSSEY, head of the shipbuilding plant operated under such name at the foot of Henry Street, Tottenville, S. I., died at his home on Johnson Avenue, Dec. 8, after a brief illness. He was 62 years of age and widely known in the shipbuilding business. His first enterprise in this line was in Brooklyn 33 years ago. He came to Tottenville about 14 years ago, establishing his present yard.

GEORGE W. HODGES, sales manager Goodell Co., Antrim, N. H., agricultural implements, died Nov. 23 in a hospital at Quincy, Mass. He was graduated from Yale in 1891 and then became traveling salesman for the Goodell Co., with headquarters in Chicago.

JOHN H. D. SMITH, who for 30 years was treasurer of the Boston Belting Co., died at his home in Boston, Dec. 9, following a short illness. Mr. Smith was born at North Andover, Mass., Dec. 6, 1836.

DANIEL WILLIAMS, aged 67, for some years superintendent of the open-hearth steel plant of the N. & G. Taylor Co., Cumberland, Md., died in a hospital in that city on Dec. 9. Mr. Williams was born in Wales, and came to this country nearly 30 years ago. He had been connected with the N. & G. Taylor Co. for over 17 years.

DAVID MCK. LLOYD, vice-president, Peoples Savings & Trust Co. and a director of the Peoples Savings Bank, Pittsburgh, died at his home in that city on Wednesday, Dec. 10. Many years ago, Mr. Lloyd was engaged in the iron business under the firm name of Lloyd & Black.

HUGH McCAFFREY, president McCaffrey File Co., Philadelphia, died Monday at his home in Philadelphia. He was prominent in the affairs of the American Hardware Manufacturers Association. He was 76 years old.

JAMES S. ALLISON, vice-president and general manager of Isaac A. Sheppard Co., Baltimore, stove manufacturer, died Dec. 2 at his home at the age of 66. Mr. Allison entered the employ of the company when he was 16 years of age.

The Standard Forgings Co., Indiana Harbor, Ind., is changing 43 forging furnaces from hand firing to powdered coal burning. The Quigley air transport system will be installed for transporting fuel from the milling plant to the furnace bins, for distances totalling approximately 1600 ft. The Quigley Furnace Specialties Co., New York City, is furnishing the equipment.

The blast furnace of the Pulaski Iron Co., Pulaski, Va., was blown out on Dec. 8, for relining and repairs. The unit has been in constant blast for the past three years; it has a record for never having gone out for any other purpose than relining or rebuilding in a period of 30 years of service.

# Machinery Markets and News of the Works

## INQUIRY FOR 200 TOOLS

### Wright Aeronautical Corporation Issues Large List

#### Buying of Machinery Continues Satisfactory Despite Restrictions on Industry Due to Coal Shortage

The Wright Aeronautical Corporation, a new concern, which will take up some of the work formerly done by the Wright-Martin Aircraft Corporation, has issued a list of 200 miscellaneous machine tools for the manufacture of airplane and automobile motors. Manufacturing operations will be conducted at New Brunswick, N. J., and Long Island City, N. Y. Other companies in the automotive field are buying or planning to buy, and this industry now figures largely in present demand and future prospects. The Willys Corporation and the New Departure Mfg. Co. have continued to buy and the Stevens-Duryea Co. has placed a few small orders, with more buying to follow.

The list of the Farrel Foundry & Machine Co., Ansonia, Conn., consisting of more than 70 large tools, is reported to be the requirements of the plant at Buffalo acquired by this company from the Fore River

Shipbuilding Co. The American Locomotive Co., which will spend several million dollars in plant expansion, has inquiries out for a large number of tools, plate-working machines, etc. It is expected by the trade that its purchases of equipment will total \$500,000. The General Electric Co. is buying tools for its newly acquired Rochester, N. Y., plant and the small-motor plant it is building at Decatur, Ind. The Mergenthaler Linotype Co., New York, has bought about 20 lathes. The Magor Car Corporation, Passaic, N. J., has bought a part of its recent list of about 50 machines.

Cincinnati machine-tool builders report that present prosperity is far in excess of past experience aside from the war period.

While the Chicago district has been somewhat harder hit by the coal shortage than other sections of the country, a fairly steady demand for machine tools continues in that market. The General Motors Corporation has purchased tool-room equipment for its Muncie, Ind., plant. The Buda Co., Harvey, Ill., is contemplating the purchase of equipment.

An Italian automobile manufacturer is inquiring at Cleveland for 100 automatic screw machines.

The Willys Corporation, Elizabeth, N. J., is in the market for 12 cranes. The Cerro de Pasco Copper Co. has bought five cranes.

## New York

NEW YORK, Dec. 16.

While December sales of machine tools in this market probably will not equal the high records of November, a good business is being done in spite of the restrictions which were put on industry last week because of the coal shortage. Not only is a very fair business being done, but prospects for the new year look encouraging as many companies are known to be figuring on equipment to be purchased out of 1920 appropriations.

The automotive industry continues a large factor in present buying and future prospects. The New Departure Mfg. Co., Bristol, Conn., has made large additional purchases for plant additions; the Willys Corporation, Elizabeth, N. J., continues to round out its equipment requirements; the Stevens-Duryea Co., Chicopee, Mass., has let a contract for a plant addition and has bought a few tools, with more to be inquired for soon; the Wright Aeronautical Corporation, New Brunswick, N. J., and Long Island City, N. Y., has issued a list of about 200 tools, and several Eastern companies engaged in manufacturing automobile accessories, such as lighting and starting systems, magnetos, spark plugs, etc., are known to be figuring on lists to be bought early in 1920.

These are the outstanding developments in the machine-tool field so far as the automotive industries are concerned. The plans of the Wright Aeronautical Corporation have not been fully divulged, but it is reported that airplane engines and Simplex automobiles will be manufactured. The concern takes in a part of the former officary of the Wright-Martin Aircraft Corporation, which has been absorbed by the International Motor Co., Plainfield, N. J. The list of tools put out by the new Wright organization includes equipment for development work, for production and for a tool room. The equipment required for development work includes two Boye & Emmes engine lathes, two American lathes, one Porter-Cable lathe, eight Hendey lathes, one Fox lathe, one Bardons & Oliver hand screw machine, one Libby turret lathe, two Stark bench lathes, one Blount speed lathe, one Cincinnati vertical milling machine, two Cincinnati plain milling machines, two Cincinnati universal milling machines, one Van Norman duplex milling machine, one Whitney hand miller, one Ohio shaper, one Pratt & Whitney vertical shaper, one Woodward power planer, one American 4-ft. radial drill, one Aurora plain drill, three Allen sensitive drills, one sensitive bench drill, one universal power mil-

ler, one Racine power hack saw, two Blount tool grinders, one Gardner wet tool grinder, one Le Blond universal cutter grinder, one Landis plain grinder, one Heald internal grinder, one Heald surface grinder, one Heald cylinder grinder, one Bath universal grinder.

For a tool room the following machines are wanted: Ten Hendey engine lathes, one Blount speed lathe, one Sloan & Chase bench lathe, one Rivett lathe, one Cincinnati vertical milling machine, three Brown & Sharpe universal milling machines, one Van Norman duplex milling machine, one Whitney hand miller, one Lucas boring mill, one American radial drill, two Leland & Gifford sensitive drills, one Brown & Sharpe plain grinder, one Brown & Sharpe universal grinder, one Heald internal grinder, one Heald surface grinder, one Rivett internal grinder, one Brown & Sharpe surface grinder, one Norton universal cutter grinder, one Cincinnati surface cutter grinder, three Le Blond surface cutter grinders, one Pratt & Whitney vertical shaper, one Potter & Johnson shaper, three Blount tool grinders.

For production the Wright company will want one Acme automatic, one Brown & Sharpe automatic, 14 Warner & Swasey hand screw machines, two Fox lathes, six Gisholt turret lathes, 12 Jones & Lamson turret lathes, one Le Blond crank pin lathe, four Boye & Emmes engine lathes, one Hendey engine lathe, one Blount speed lathe, one Rivett bench lathe, two Porter-Cable lathes, six Cincinnati vertical milling machines, one Becker vertical milling machine, fourteen Cincinnati plain milling machines, two Cincinnati universal milling machines, two Briggs plain milling machines, two Kemp-smith plain milling machines, two Pratt & Whitney thread millers, one Lucas boring mill, one Moline boring mill, four Barnes plain drills, six American radial drills, six Leland-Gifford sensitive drills, two Cincinnati bench drills, two Landis plain grinders, one Landis universal grinder, one Brown & Sharpe universal grinder, four Fitchburg plain grinders, one Bath universal grinder, one Capital internal grinder, four Heald internal grinders, two Heald surface grinders, one Bryant chucking grinder, one Gould & Eberhardt gear cutter, one Gould & Eberhardt gear hobber, one Gleason gear generator, one Fellows gear shaper, one Gardner disk grinder, one Pond planer, one Bradley compact hammer, two Bliss punches, one Bliss power shear, one La Pointe broaching machine, one E. M. S. threading machine, one National nut tapper, one Norton balancing machine, two Whiton centering machines, one Racine power hack saw, 15 Blount tool grinders, one Yankee tool grinder, one Landis cam grinder, two Landis plain grinders.



Another list, which was referred to briefly in this column last week, comes from the Farrel Foundry & Machine Co., Ansonia, Conn., and presumably covers equipment needed for the plant at Buffalo acquired by this company from the Fore River Shipbuilding Co. The Farrel list includes 12 planers in the following sizes, 10 x 36 ft., 8 x 36 ft., 7 x 30 ft., 6 x 24 ft., 5 x 24 ft., 3 x 18 ft. and 30 in. x 10 ft.; four 24-in. shapers, one 18-in. shaper; one 6-ft., two 5-ft. and one 3-ft. radial drills; one 24-in. upright drill, four 26-in. turret lathes; six 24-in., two 30-in., one 36-in., one 30-in. and two 18-in. engine lathes; three Brown & Sharpe milling machines, one 600-lb. steam hammer, one bolt cutter, one alligator shear, one bench shear, two 18-in. slotters, five boring mills ranging in size from 4 1/2 to 14 ft.; four 30-in. Bullard vertical turret lathes, two Betts 5-in. horizontal boring mills, and two 6-in. Barrett horizontal boring mills. Other tools inquired for include cutter and surface grinders, tool grinders, drill grinders, disc grinders, etc.

The American Locomotive Co., New York, will spend several million dollars in plant expansion, of which at least \$500,000 is to be expended for machine tools. The company is at present figuring on a considerable part of this equipment. The American Car & Foundry Co., New York, which has recently inquired for plate working machines and tools, is about to close on at least a part of its requirements.

The General Electric Co. has purchased equipment for its Rochester, N. Y., and Decatur, Ind., plants. It is expected that its Bloomfield, N. J., unit will soon be in the market also for new tools.

The Dittmer Gear & Mfg. Corporation, Lockport, N. Y., a new concern, has bought new and used tools in New York for its plant.

The crane market continues slow with few domestic and practically no export inquiries, although one manufacturer has several small inquiries from Australia and South America. An inquiry is in the market from the Willys Corporation, successor to the Duesenberg Motors Corporation, Elizabeth, N. J., for 11 electric operating cranes and one 15-ton power crane, consisting of shop, bucket and transfer cranes. The Navy Department is asking proposals on three 5 and 10-ton hammer head cranes; two for the Norfolk yard and one for Philadelphia. The Youngstown Boiler & Tank Co. is inquiring for two 10-ton overhead cranes. From the San Francisco office of a New York dealer comes an inquiry for a 30-ton, 36 ft. span hand power crane.

James Stewart & Co., recently mentioned as having closed a contract with the Standard Oil Co., Toledo, Ohio, which included one crane, has purchased from the Champion Engineering Co. an overhead bucket crane with 20 ft. span and 90 ft. lift. The Lancaster Iron Works, Lancaster, Pa., has purchased a 10-ton, 60 ft. span electric crane. Dwight P. Robinson & Co. has purchased for a contract with the Pennsylvania Public Service Corporation at Seward Station, Pa., a 50-ton, 4 motor power house crane. The Eastern Potash Co., New Brunswick, N. J., has purchased from the Champion Engineering Co., New York, a 25-ton crane with 56 ft. span. The Cerro De Pasco Copper Corporation has purchased for a new smelter at Oroya, Peru, a 70-ton ladle crane with two 20-ton auxiliary hoists, 56 ft. 3 in. span from the Alliance Machine Co., Alliance, Ohio; and from Pawling & Harnischfeger, a 20-ton electric crane, 79 ft. span for power house; two 15-ton 48 ft. span; one 10-ton 58 ft. span and one 10 ton 37 ft. span, electric traveling cranes. The Otis Elevator Co. has purchased 3 small cranes from the Bedford Foundry & Machine Co.

The General Electric Co., Schenectady, N. Y., has acquired the plant of the Symington Works, Leighton Avenue, Rochester, N. Y., known as plant A and used during the war period for the manufacture of munitions. The structures comprise about 125,000 sq. ft. of floor space, with main building, 770 ft. long, and will be used by the new owner for the manufacture of electrical goods. In connection with this purchase, the company has announced plans for extensive expansion, including the acquirement of a factory at Providence, R. I., to be employed for the manufacture of small electrical devices; the construction of a large machine shop at Erie, Pa., and the erection of a new plant at Decatur, Ind., site for which has recently been purchased. Plans are also under way for the erection of additions to manufacturing plants now being operated in different parts of the country.

The Standard Oil Co., Constable Hook, Bayonne, N. J., has filed plans for a steel and concrete can shop at Lower Constable Hook, to cost about \$200,000.

The American La France Fire Engine Co., Elmira, N. Y., manufacturer of motor-driven fire equipment, has arranged for the establishment of its proposed new motor truck manufacturing plant at Bloomfield, N. J., instead of in the vicinity of its present works, as previously announced. Property aggregating about 22 acres has been acquired on Bloom-

field Avenue, Arlington Avenue, Beardsley Avenue and Brookside Place, and preliminary plans are under way for the first plant unit to comprise about 100,000 sq. ft. of manufacturing area. Additional units, it is said, will be erected at a later date.

The City Commission, Jersey City, N. J., has authorized the purchase of land for a new machine and repair shops for the city fire department trucks and equipment.

The Vreeland Motor Co., Inc., 407 Elizabeth Avenue, Newark, N. J., manufacturer of motor trucks, is planning for a new plant in the Irvington section. Property aggregating about 8 acres has been acquired and construction will be inaugurated in the early spring. The additional capacity will be about 400 trucks per year. E. E. Vreeland, formerly president and general manager of the Abbot-Downing Truck & Body Co., is president. S. D. Weaver is vice-president and general manager.

The Upson-Walton Co., 462 Riverside Avenue, Newark, N. J., manufacturer of wire rope, has filed plans for a one-story brick addition 39 x 188 ft., to cost \$36,000.

The National Welding Co., 80 Dickerson Street, Newark, N. J., has filed plans for a one-story shop addition, 40 x 95 ft., to cost \$10,000.

A. Stamler, Inc., Elizabeth, N. J., has been incorporated with a capital stock of \$50,000 by Alexander, Samuel and Charles J. Stamler, to manufacture tools.

William E. Quimby, Inc., 209 Parkhurst Street, Newark, N. J., manufacturer of electric pumps, has increased its capital stock from \$125,000 to \$200,000.

The Cellulose Products Co., Paris, near Magazine Street, Newark, N. J., has had plans prepared for a one-story automobile machine shop and service building, 25 x 90 ft., at 187 Magazine Street.

The American Hammered Piston Ring Co., Baltimore, Md., has sold its former plant at 700 South Eleventh Street, Newark, N. J., to the Qualtooy Co., a new organization, which will equip it for the manufacture of mechanical and other toys. The factory is one-story, brick, 125 x 246 ft. Morris Fisher is vice-president of the purchasing company, and Frank Torre is secretary.

C. W. Curtis, Newark, N. J., formerly general manager of the Spltkdorf Electrical Co., 98 Warren Street, and A. B. Chase, formerly factory manager for the same company, have organized a new company to manufacture electrical goods. The organization has acquired the old Hedenberg Iron Works plant at Plane, Hackett and Warren streets, and will demolish the present structures, erecting a new plant to cost close to \$1,000,000. The first unit will comprise an eight-story factory, aggregating 130,000 sq. ft. of floor space, and is estimated to cost \$400,000. Construction work will be inaugurated early next year.

The Metal Hose & Tubing Co., 253 Tillary Street, Brooklyn, has awarded a contract to the Burke Brothers Construction Co., 62 West Forty-fifth Street, New York, for a three-story plant, 98 x 102 ft., at Raymond Street and Park Avenue, to cost about \$150,000.

In connection with the proposed aerial defense station of the War Department, Washington, on Staten Island, N. Y., to cost about \$1,000,000, it is planned to build a one-story machine shop, 100 x 150 ft., for parts manufacture and engine repair work; three hangars, 60 x 400 ft., and other industrial buildings. The Construction Division of the department will be in charge.

The Consumers Tire & Rubber Co., 16 Beaver Street, New York, has increased its capital stock from \$100,000 to \$1,500,000.

The Acetylene & Electric Welding Machine Co., New York, has been incorporated with a capital stock of \$11,000 by L. Scheuer, R. E. Polhemus and S. Dannenberg, 407 East Fiftieth Street, to manufacture apparatus.

The Shipley Construction & Supply Co., Columbia and Warren streets, Brooklyn, manufacturer of ice-plant machinery, has arranged for a two-story plant, 240 x 340 ft., on Forty-first Street, near Second Avenue.

The Esch Mfg. Corporation, New York, has been incorporated with a capital stock of \$250,000 by H. S. Esch, 337 St. Ann's Avenue; T. F. Fay and W. G. Whaley, 27 William Street, to manufacture metal treads for automobiles.

The American Can Co., 120 Broadway, New York, is building a four-story and basement plant, 66 x 285 ft., at Sixth and Front streets, Grand Rapids, Mich., to cost about \$300,000, including equipment.

The Bay Machine Co., Brooklyn, has been incorporated with a capital stock of \$50,000 by T. E. Shea, J. A. Clynes and P. J. McGrath, 145 East Eighty-second Street, to manufacture machinery and parts.

The Wilson-Maeulen Co., 781 East 142d Street, New York, manufacturer of pyrometers, etc., has arranged for

the erection of a two-story plant, 50 x 100 ft., at Concord Avenue and St. Mary's Street, to cost about \$25,000.

The Schifter & Simon Corporation, New York, has been incorporated with a capital stock of \$20,000 by A. Simon, J. and E. Schifter, 131 West Twenty-first Street, to manufacture textile machinery.

The American Steel Wool Mfg. Co., 451 Greenwich Street, New York, has increased its capital stock from \$40,000 to \$160,000.

S. & C. Hyman, 2069 Fifth Avenue, New York, will make improvements in their machine shop on Grand Street, four-stories and basement, to cost about \$25,000.

The Carburetor Lock Co., New York, has been incorporated with an active capital of \$275,000 by H. Hoch, L. B. Galbally and H. Van Riper, 61 Broadway.

The Nichols Copper Co., Laurel Hill, Long Island, N. Y., has arranged for a plant addition to cost about \$30,000.

The White Service Station & Motor Co., 280 Central Avenue, Albany, N. Y., is considering the erection on North Broadway of a one-story machine shop and service works, 75 x 200 ft.

The United States Shipping Board, Emergency Fleet Corporation, Philadelphia, has arranged for the sale of its steel shipbuilding plant at Port Jefferson, Long Island, N. Y., comprising shipways, buildings, machinery and equipment, etc.

The T. E. Reinhalter Corporation, Middletown, N. Y., has been incorporated with a capital stock of \$50,000 by Don E. Stuart, Middletown; W. L. Maguire, Kingston, Pa., and Peter Reinhalter, Wilkes-Barre, Pa., to manufacture tools, machine parts, etc.

The G. Piel Co., 29 Thirteenth Street, Long Island City, N. Y., manufacturer of machinery, automobile parts, etc., has completed plans for a six-story plant, at Seventh and Eighth streets, and Washington Avenue, 150 x 200 ft.

## New England

BOSTON, Dec. 15.

Increased activity, although spotty, is noted in the local machine-tool market, with business confined mostly to single machines. The General Electric Co., Lynn, Mass., is inquiring for considerable automatic machinery for its 1920 budget and other inquiries, together with dickerings on possible orders which developed two weeks or more ago, have kept machine-tool interests well occupied. The general sentiment for business in 1920 is highly encouraging. Deliveries have become more extended, especially for machines from the Middle West where the coal situation has been most disturbing. Eastern machine-tool makers are well sold ahead. The Saco-Lowell Shops, for instance, have enough business booked to operate at capacity for considerably more than a year, and the Brown & Sharpe Mfg. Co., Providence, R. I., is sold up through 1920 on a number of its machines. There is a big demand for screw-machine products, on which deliveries are growing quite extended. Textile-machine interests in the Providence and western Massachusetts districts are filled with orders, and the foreign demand for equipment is expanding satisfactorily.

The Blake & Knowles interests have inquiries out on several 6 and 8-ft. boring mills, in addition to its regular 1920 budget. The Boston & Albany Railroad purchased a pipe-threading machine, and the Boston & Maine is showing some activity. Other New England railroads are not important factors in the machine-tool market. Stone & Webster have purchased a 90-ton crane for the Philadelphia Electric Co. A Hyde Park, Boston, concern bought a milling machine the past week, and the General Fire Extinguisher Co., Providence, R. I., purchased a multiple drill. The Brown & Sharpe Mfg. Co., Providence, bought an automatic turret lathe, and the Mason Machine Works, Taunton, Mass., has been buying some equipment but has not yet covered its requirements. The Saco-Lowell Shops have no list, but have bought additional machines and have a large number on order. A Portland, Me., concern is in the market for a hydraulic hoist. Bids on some of the work for the Rolls-Royce plant at Springfield, Mass., will close in about a week.

Frank Stroms, Springfield, Mass., is forming a company with the intention of starting a new drop-forge shop.

Preliminary plans are being made for a factory for the American Specialties Co., Bridgeport, Conn.

The Manning Bowman Co., manufacturer of nickel, silver plated and enameled ware, has let contract for an addition to its Meriden, Conn., plant.

Col. William C. Skinner, president of the Colt's Patent Fire Arms Mfg. Co., denies the report that the company's plant at Meriden, Conn., has been sold to the General Motors Corporation.

Plans are being drawn for a factory for the Boston Pressed Metal Co. on Union Street, Worcester, Mass.

Paul O'Connell and others have bought the assets and good-will of the Yankee Tool Corporation, Bridgeport, Conn., for \$22,000. The equipment will be moved to New Haven.

The Whitlock Coil Pipe Co., Hartford, Conn., is making additions to its plant which will give about 20,000 sq. ft. of floor space. When completed the working force will be increased to 225.

The plant of the Hartford Burial Case Co., Berlin, Conn., has been bought by the Mosel Mfg. Co. and will be re-opened for the manufacture of metal goods. New machinery will be installed within a few weeks.

The Royal Typewriter Co., Hartford, Conn., has let contract for the erection of a new factory and ell, the fourth unit in the plant, giving additional floor space of about 100,000 sq. ft.

The Hartford Tube Products Co., Hartford, Conn., has acquired land adjacent to its holdings in the Elmwood district of West Hartford, upon which a series of factories will be built. A spur track is being constructed to connect the property with the New Haven Railroad.

The Hiee Products Co., Lowell, with a capital of \$50,000, has been chartered to make motor accessories, vehicles, combustion engines and equipment. Harley E. Cover, 20 Grand Street, Lowell, is president.

The Pneumatic Scale Co., Norfolk Downs, Mass., has awarded contract with the Aberthaw Construction Co., Boston, for a manufacturing and office building of reinforced concrete, three stories, 150 x 160 ft. Its completion will practically double the plant's capacity.

The Hartford-Fairmount Co., Hartford, Conn., manufacturer of glass machinery, has completed plans for the erection of an addition to its plant totaling about 28,000 sq. ft.

The Rhode Island Crucible Steel Co., Pawtucket, R. I., has acquired property at South Main and Tockwotten streets, Providence, and will remove its works to this location early in the coming year.

The Rhode Island Fittings Co., Hills Grove, R. I., manufacturer of pipe fittings, will build a two-story plant, 41 x 50 ft., on Newell Avenue, Pawtucket, to cost about \$30,000.

The New England Westinghouse Co., Chicopee Falls, Mass., is planning for the construction of an addition to its plant at East Springfield, Mass., to cost about \$150,000. The extension will be equipped for the manufacture of small motors.

The Sanford Riley Stoker Co., Worcester, Mass., builder of automatic stokers, will erect shops on a tract of land on West Boylston Street, containing over five acres, with right of way for a spur track to the Boston & Maine Railroad. At present its stokers are built in the plant of the Murphy Iron Works, Detroit, which is controlled by the Worcester company. When the plant is completed the Eastern orders will be filled from the new shops and the Murphy company will take care of the Western trade. The initial building will contain about 30,000 sq. ft. of floor space and will employ a force of 100. The West Boylston Street property was owned by the Standard Screw Co.

The Crompton & Knowles Loom Works, Worcester, Mass., will erect a six-story concrete shop at its Worcester plant. It is making extensions to its Providence, R. I., works, and had not intended to build in Worcester before next summer, but increasing business makes the additional room imperative.

The Simplex Piano Action Co., Worcester, will double the capacity of its factory by the erection of new buildings. A main structure will give 50,000 sq. ft. of floor space, and in addition there will be several dry kilns and other structures.

The Standard Plunger Elevator Co., Worcester, Mass., proposes to increase its line of machine tools soon after the first of the year. At present it builds plunger elevators and the planer of the Powell Machine Co., under royalty. This line will be extended with other types, announcement of which the company is not yet ready to make.

## Buffalo

BUFFALO, Dec. 15.

The Auto Products Mfg. Co., 128 Erie Street, Buffalo, has let a contract to Fred S. Mathewson, 680 Grand Street, for its one-story plant, 60 x 100 ft.

The King Electric Mfg. Co., Tonawanda, N. Y., has been incorporated with a capital stock of \$25,000 by L. Smith, B. Kibler and V. F. King to manufacture electrical equipment.

Francis P. Garvan, Allen Property Custodian, has postponed indefinitely the sale of property of the J. P. Devine Co., 1374 Clinton Street, Buffalo, manufacturer of vacuum



drying machinery. The sale was scheduled previously for Nov. 24 and Dec. 1.

The Lehigh Valley Railroad, Granite Building, Rochester, N. Y., has had plans prepared for a repair shop and engine house on Crouch's Island, to cost about \$25,000.

The J. B. Campbell Brass Works, Erie, Pa., is planning for the sale of its plant and equipment to new interests.

The High Speed Hammer Co., St. Paul Street, Rochester, N. Y., will build a one-story foundry addition, 55 x 82 ft.

The Rochester Mfg. Co., 29 Halsted Street, Rochester, N. Y., manufacturer of automobile parts, has increased its capital stock from \$10,000 to \$100,000.

## Philadelphia

PHILADELPHIA, Dec. 15.

The new addition to the plant of the Wyoming Shovel Works, Wyoming, Pa., will be one-story, 120 x 450 ft., and with equipment is estimated to cost \$250,000.

The Bethlehem Steel Co., Lebanon, Pa., is planning for the establishment of a large foundry at its local works. It has dismantled the electric steel plant and shipped the large billet mill to its Bethlehem works. The steel building on Fifth Street, used for this purpose, will be employed for the new foundry. Plans are also being arranged for the erection of a new brick and steel building near the present iron foundry for mechanical department service.

The Pennsylvania Forge Co., Jenks and Bath streets, Philadelphia, has awarded a contract to the William G. Donley Co., Drexel Building, for a one-story rolling mill, 102 x 200 ft., to cost \$30,000. A one-story power plant addition, 42 x 51 ft., will also be constructed.

The Westinghouse Electric & Mfg. Co., Essington, Pa., is having plans prepared for a two-story addition, 130 x 500 ft., to cost in excess of \$500,000, including equipment.

The John A. Roebling's Sons Co., Trenton, N. J., has filed plans for two one-story brick additions, at Elmer and Canal streets, and on Dye Street.

The Lehigh Machine Co., Lehighton, Pa., has awarded a contract to the Milliken Brothers Mfg. Co., Woolworth Building, New York, for a one-story steel building, 40 x 160 ft., to be equipped as a machine shop.

The Birdsboro Steel Foundry & Machine Co., Reading, Pa., will build a one-story machine shop addition, 60 x 187 ft., to be equipped to handle the machining of work weighing up to 50 tons.

The Read Machine Co., 231 North George Street, York, Pa., will build a one-story boiler plant on Grantley Street, 40 x 50 ft., to cost about \$20,000.

A central power plant for several mill buildings is planned by the Phoenix Silk Mfg. Co., Race and Linden streets, Allentown, Pa.

The Link-Belt Co., Nicetown, Philadelphia, manufacturer of conveying machinery, etc., with general offices at Chicago, is planning for a new office at its Philadelphia works, remodeling the present office building into a shop extension. The company will also build an addition to its foundries at Indianapolis.

The Tabor Mfg. Co., Eighteenth and Hamilton streets, Philadelphia, manufacturer of foundry machinery, has completed plans for a one-story steel and concrete addition to cost \$50,000.

A boiler plant to cost about \$25,000 will be erected by the Continental Mills Co., Lena and Armat streets, Philadelphia.

The Ford & Kendig Co., 1428 Callowhill Street, Philadelphia, manufacturer of steam specialties, with plant at 312 North Twenty-fourth Street, has increased its capital stock from \$500,000 to \$1,000,000.

The Franklin Process Co., Drexel Building, Philadelphia, manufacturer of textile and dyeing machinery with headquarters at Providence, R. I., will build a two-story branch plant, 75 x 103 ft., at Clearfield and Howard streets, Philadelphia, to cost about \$45,000.

## Pittsburgh

PITTSBURGH, Dec. 15.

The Mine Safety Appliances Co., 911 Chamber of Commerce Building, Pittsburgh, will erect a one-story machine shop at Thomas Boulevard and Braddock Avenue, to cost about \$65,000. A chemical department will also be installed. George H. Dicke is president.

The Pittsburgh Model Engine Co., Pittsburgh, has filed plans for additional buildings at its plant at Lexington Avenue and McPherson Boulevard, to cost about \$25,000.

The Chaplin-Fulton Mfg. Co., 28-24 Penn Avenue, Pittsburgh, manufacturer of steam fittings, etc., has awarded a contract to Cuthbert Brothers, Bessemer Building, for a two-story addition, 15 x 110 ft., to cost \$35,000.

The American Instrument Works, Inc., 15 East Lacock Street, Northside, Pittsburgh, manufacturer of dies, jigs, tools, etc., is planning for enlargements to increase capacity.

The plant of the Monongahela Iron & Steel Co., Hays Station, near Homestead, Pa., comprising about 10 acres of land, has been acquired by the John Eichleay, Jr., Co., Pittsburgh, for a consideration of about \$250,000. The property was formerly known as the Carter Iron Works, and consists of a rolling mill and number of iron and steel working mills. It is said that the new owner plans to operate the plant at an early date.

The West Virginia Eagle Coal Co., 1101 Union Building, Charleston, W. Va., recently incorporated with a capital stock of \$100,000, is planning for the development of extensive coal properties near Boomer, W. Va., and will install steel monitors, electric motors and other equipment, including mining machinery. William G. Conley is president; J. E. Charlton, treasurer and manager.

The American Armature Engineering Co., Bluefield, W. Va., has been incorporated with a capital stock of \$25,000 by A. A. Grant and A. D. Knight, to manufacture armatures, etc.

## Baltimore

BALTIMORE, Dec. 15.

The Elgin Mfg. & Plating Co., 3 East Lexington Street, Baltimore, has been incorporated with \$100,000 capital stock to manufacture electric flashlights, carbide lamps and novelties and to do electroplating. The incorporators are Edward W. Haydon, Albert A. Ross and Emma K. Ross.

The Electromechanical Co., 530 North Calvert Street, Baltimore, has increased its capital stock from \$15,000 to \$50,000.

George C. Smith, director of the industrial bureau, Board of Trade, Baltimore, has reported 11 new local industries and 17 expansions were brought about in November, meaning an expenditure of about \$1,275,000. He points out that the figures do not include the plans of the Bethlehem Shipbuilding Corporation, Ltd., to bring many skilled workmen here from the Squantum works of its Fore River plant. Among the new industries he mentions are the Parker Metal Decorating Co., which has acquired a factory to decorate tinplate for cans, signs, etc., and the Seaboard Paint Mfg. Co., which is building a plant.

The American Spike Co., 55 Liberty Street, New York, is reported contemplating the establishment of a branch plant in Baltimore.

The E. Richardson Brass Co., 318 North Holliday Street, Baltimore, has acquired a building on Exeter Street, and will remodel it at a cost of about \$15,000 for a works extension.

The Delion Tire & Rubber Co., Trenton, N. J., has secured a site at Baltimore and plans a new plant with daily capacity of about 500 tires. Its Baltimore office is at 131 Mount Royal Avenue.

The du Pont Motors Mfg. Corporation, Wilmington, Del., manufacturer of automobiles, has increased its capital stock from \$100,000 to \$200,000.

The Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, is planning for a two-story factory, 53 x 100 ft., on Kloman Street, near the Western Maryland Railroad, for the manufacture of gas appliances, with estimated cost of \$50,000.

The Eastern Shore Can Co., Hurlock, Md., now building a plant for the manufacture of cans and other metal containers, has filed articles of incorporation with a capital of \$500,000. The plant is expected to be ready for occupancy early in the coming year. Equipment will be provided for about 150 employees. Walter M. Wright, Elbert Douglas, George W. Woolford and Robert Jarrel, Jr., head the company.

The Crown Cork & Seal Co., 1511 Guilford Avenue, Baltimore, manufacturer of bottling machinery, metal bottle caps, etc., is considering plans for an addition on Latrobe Street, inaugurating active construction in the spring. J. M. Hood, Jr., is president.

The United States Shipping Board, Emergency Fleet Corporation, 140 North Broad Street, Philadelphia, is asking bids until Jan. 15, for the purchase of the real estate, buildings, machinery and equipment of the Richmond Boiler Works, Richmond, Va. The site consists of about 52 acres; the main building is 160 x 600 ft., with power house, 40 x 180 ft.; locomotive house, 30 x 50 ft. and a number of other buildings.

The Charleston Dry Dock & Machine Co., Charleston, S. C., has been formed with a capital stock of \$2,500,000 to take over and operate the plant of the Valk-Murdoch Co. It is planning for several additions, including boiler shops, machine shop and foundry. W. R. Bonsal is president, and Charles Valk is vice-president.

The Ross-Meehan Foundries, Chattanooga, Tenn., manufacturer of gray and malleable iron castings, is planning for a one-story addition to cost about \$30,000.

The Murnan Shipbuilding Corporation, Mobile, Ala., has received a contract for ten barges for the Government to be used at Muscle Shoals, near Florence, Ala.

The Beggs Foundry Co., Bessemer, Ala., has been organized to operate a local plant. Oscar Cochran and J. P. Beggs head the company.

The Vulcan Rivet Co., Birmingham, Ala., recently incorporated with a capital stock of \$75,000, is planning for the enlargement of its plant, used for the manufacture of rivets, bolts, spikes, etc.

Clyde J. McNerny, Miami, Fla., is planning to establish a plant for the manufacture of automobile air brakes.

The Griffin Foundry & Mfg. Co., Rome, Ga., will build an addition, 80 x 80 ft. M. N. Griffin is president.

The Atlantic Engineering Co., Commercial Bank Building, Savannah, Ga., wants prices on locomotive type cranes with 30-ft. boom.

The Baltimore Car & Foundry Co., Curtis Avenue and Beach Street, Curtis Bay, Baltimore, will build a one-story plant addition, 90 x 1660 ft., to cost \$100,000.

## Chicago

CHICAGO, Dec. 15.

With most industries in this district restricted to three days operation last week, activity in the machine-tool trade was to some extent slackened. The aggregate of business, however, is generally regarded as satisfactory for this time of the year, with numerous small sales the outstanding feature of the market. Deliveries have been further retarded by the reduction in machine-tool production resulting from the coal shortage. The Kearney & Trecker Co., manufacturer of milling machines, Milwaukee, and other tool manufacturers have installed oil burners under their boilers in an effort to keep running. The resumption of coal mining, however, is expected to relieve the fuel famine soon.

The Hurley Machine Co., West Twenty-second Street and Fifty-fourth Avenue, Cicero, Ill., is in the market for about 10 miscellaneous tools. The Buda Co., Harvey, Ill., is also contemplating the purchase of equipment. The General Motors Corporation has purchased tool-room equipment for its Muncie, Ind., plant, and the H. C. S. Motor Car Co., Indianapolis, has bought for its new plant.

Construction has commenced on a three-story plant, 110 x 159 ft., for the Player Phone Talking Machine Co., at 4223-4237 West Lake Street, Chicago. The estimated cost is \$100,000.

The Guyton & Cumfer Mfg. Co., manufacturer of special machinery, 4451 Fillmore Street, Chicago, has awarded a contract for the erection of a two-story machine shop at 4430 West Fillmore Street, to cost \$60,000.

The Standard Screen Co., manufacturer of window screens, 1858 Hastings Street, Chicago, is receiving bids on a two-story addition, 50 x 70 ft., to cost \$18,000.

The Advance Machine Co., 4645 Ravenswood Avenue, Chicago, will build a second-story addition, 25 x 100 ft., to cost \$10,000.

The Continental Can Co., 4645 Grand Avenue, Chicago, will erect a one-story addition, 20 x 98 ft., to cost \$5,000.

The Pullman Co., 79 East Adams Street, Chicago, has awarded a contract for the construction of two one and two-story buildings, 100 x 117 ft. and 54 x 153 ft., which will extend east from East 105th Street. The total cost is \$150,000.

The Buda Co., manufacturer of special trucks and cars, Harvey, Ill., has awarded a contract for the foundation of a two-story foundry, 140 x 160 ft., to cost \$75,000.

The Reliable Prating Co., Ottawa, Ill., has been incorporated with \$2,500 capital stock to do a general foundry business. The incorporators include C. Laverton, W. Woodward, Edwin Woodward and William F. Jordan.

The Waterloo Gas Engine Co., Moline, Ill., has had plans prepared for the erection of a one-story main plant, 100 x 160 ft., and a core building, 120 x 140 ft.

The Powell Steel Kitchen Co., 219 Loomis Street, Chicago, plans to erect a one-story plant, 86 x 144 ft., to cost \$25,000.

The Moore Brothers Co., Joliet, Ill., is contemplating the erection of a foundry, 67 x 70 ft., to cost \$20,000.

The Russell Grader Mfg. Co., Minneapolis, contemplates the erection of a factory and warehouse to cost \$75,000.

The Carter Sheet Metal Works, 108-112 South Tenth Street, Omaha, Neb., plans the construction of a one-story plant, 132 x 162 ft., to cost \$20,000.

Fire, Nov. 26, destroyed the coal tippie at the No. 2 shaft of the Washburn Lignite Mines Co., Wilton, N. D., with loss estimated at about \$50,000.

The McSherry Mfg. Co., Springfield, Ill., manufacturer of grain drills, disk harrows, pulverizers and other agricultural equipment, has arranged for a capital stock issue of \$1,400,000. The company has been reorganized and plans for expansion. C. A. McCann is president.

The Sloan Valve Co., 617 West Jackson Street, Chicago, has arranged for the immediate erection of a new brick plant at 4300-26 West Lake Street, to cost about \$75,000.

The Wilson Stove Co., Metropolis, Ill., manufacturer of stoves, ranges, etc., is having plans prepared for a two-story brick and reinforced concrete plant, 100 x 120 ft., to cost about \$70,000, including equipment. G. P. Wuest, Wainwright Building, St. Louis, is the architect.

## Detroit

DETROIT, Dec. 15.

The addition to the plant of the D'Arcy Spring Co., Kalamazoo, Mich., will soon be ready for occupancy. The unit is 112 x 150 ft., two stories.

The Antigo Tractor Co., Antigo, Mich., organized recently with a capitalization of \$500,000, is preparing to build a plant for the manufacture of a four-wheel drive truck. Charles W. Fish is president.

The Gear Grinding Machine Co., Chene Street and East Grand Boulevard, Detroit, is building a new one and two-story plant on Conant Road, 180 x 215 ft.

The Detroit Gear & Machine Co., 127 Franklin Street, Detroit, has arranged for the erection of an addition to its plant. A. W. Copeland is president.

The Jackson Stove & Stamping Co., Jackson, Mich., recently organized, has acquired the plants of the Boeck Stove Co. and the Novelty Mfg. Co., Jackson, and will use the works for the production of oil heating and cooking stoves and ovens.

The Commerce Motor Car Co., Mack and Solvay avenues, Detroit, is considering the erection of an addition to its plant on Green Avenue. G. W. Kellogg is secretary.

## Cleveland

CLEVELAND, Dec. 15.

An Italian automobile manufacturer is negotiating for 100 automatic screw machines and will probably place the order with a local manufacturer, provided an arrangement can be made which will relieve the buyer from the almost prohibitive rate of exchange. The prospective customer plans to market some of his cars in the United States, and it is possible that a deal will be agreed upon, under the terms of which the machine-tool manufacturer will receive pay for his machinery from the proceeds of the sale of cars in this country.

The general market continues fairly active, but the approaching holiday season is beginning to have some effect on business and inquiries and considerable lull is expected for the next few weeks. A good volume of orders is still coming from the automobile field, and the General Motors Corporation is now figuring on a round lot of equipment for its Oldsmobile plant in Lansing, Mich.

There is still a tendency toward higher prices, a number of machine-tool builders having announced advances the past week ranging from 5 to 7½ per cent. Other builders in view of the advancing cost of raw material are considering the question of marking their prices up.

The Brier-Hill Steel Co., Youngstown, Ohio, has an inquiry out for an 18-in. and a 38-in. lathe, radial drill, shaper, milling machine, small drilling machine, universal tool grinder, pipe-threading machine and power hack saw.

The Dillon Electric Co., Canton, Ohio, is in the market for a number of machine tools.

The Maersh Motor Co., formerly the Sterling Motor Co., is moving from Connecticut to Cleveland and is building a plant for the manufacture of automobiles at the Belt Line Railroad and Ridge Road. It is understood that the company will purchase considerable machinery, but a list of its requirements has not yet been prepared.

The Cornwell Tools Co., Cuyahoga Falls, Ohio, has been organized with a capital stock of \$50,000 and has acquired a factory which will be equipped for the manufacture of





HANDLING 100-LB. CUBES OF COMPRESSED SCRAP TIN CANS AT THE PITTSBURGH PLANT OF THE AMERICAN REDUCTION CO. BY MEANS OF AN 18-IN. 45-FT. BARRER-GREENE CONVEYOR

automobile mechanics' hand tools. Later the products will include various mechanics' tools and heavy cutlery. The officers are: B. L. Coleman, president; Eugene Cornwell, vice-president; H. L. Wandschneider, secretary-treasurer and general manager. Messrs. Cornwell and Coleman have been operating a plant in Pittsburgh, using the Cornwell process for forging, treating and tempering tools.

The plant of the Otto N. Moore Co., Indianapolis, Ind., will be moved to Newark, Ohio, and consolidated with the Moore Mfg. Co. under the name of the Moore Tool & Machine Co. The new company will have an authorized capital stock of \$250,000.

The Marion Foundry Co., Marion, Ohio, has been incorporated with a capital stock of \$10,000 by William Ring, E. C. Harriman and others. It has acquired a plant which will be converted into a foundry for the manufacture of steel castings.

The Summit Mold & Machine Co., Akron, Ohio, plans the erection of a machine shop at an estimated cost of \$30,000.

The Lumen Bearing Co., Youngstown, Ohio, which was organized a few months ago, is building a plant 105 x 140 ft. William H. Barr is president and treasurer, C. H. Bierbaum, vice-president, and N. K. B. Patch, secretary.

The Malbohm Motors Co., Sandusky, Ohio, will shortly begin the erection of an addition, 118 x 700 ft.

## Milwaukee

MILWAUKEE, Dec. 15.

The machine tool business has not shown appreciable effect of the situation created by the fuel shortage, although production has been materially reduced locally by the enforcement of a 36-hr. working week, and deliveries are falling behind still further.

The Seaman Body Corporation, 480 Virginia Street, Milwaukee, has awarded the general contract to Klug & Smith, Mack Block, for a five-story automobile body manufacturing plant, 225 x 420 ft., at Franklin, Richards and Lake streets, estimated to cost \$600,000. A similar unit will be undertaken about April 1. Frank Howend, 69 Wisconsin Street, is the architect.

The Cadillac Motor Car Co., Detroit, has let the general contract to the Raulf Co., 53 Patton Building, Milwaukee, for the construction of a three-story assembling plant, 150 x 204 ft., at North and Bartlett avenues, Milwaukee, which will cost about \$275,000. Equipment is being purchased through the general offices at Detroit. The architects are Kirchhoff & Rose, Majestic Building, Milwaukee.

The Onelda Motor Truck Co., Green Bay, Wis., has broken ground for factory No. 2, 70 x 250 ft., one-story and part basement, to cost about \$100,000 with additional equipment. The extensions will increase the floor space to 200,000 sq. ft., and provide a maximum capacity of 5000 motor trucks a year. Lafayette Markle is president and general manager.

The Frost Mfg. Co., Kenosha, Wis., manufacturer of

plumbers' brass goods, is erecting two shop additions, each 66 x 76 ft., to provide an increase of about 50 per cent in both casting and machine shop capacity. Walter J. Frost is president.

The Highway Trailer Co., Edgerton, Wis., has authorized an issue of \$320,000 of 7 per cent preferred stock to finance extensions to its shops and the purchase of additional equipment for manufacturing trailers for general haulage purposes. Ground has been broken for an addition, 160 x 510 ft., of which 40 x 160 ft. will be two stories.

The Board of Education, Oconomowoc, Wis., is taking sealed bids until Jan. 15 for the erection and equipment of a new high school building, with vocational training department, designed by Parkinson & Dockendorff, architects, La Crosse, Wis., and estimated to cost \$250,000. H. Kirk White is secretary of the board.

The International Steel Products Co., Hartford, Wis., manufacturer of silencers or mufflers for internal combustion engines, has arranged for additional working capital to increase its production and to provide for a larger output.

The Stevenson Mfg. Co., Barton, Wis., has placed orders for a considerable list of lathes, drill presses, forges and other equipment for its new factory, which will be ready about Feb. 1. The company has a capital stock of \$125,000 and will manufacture steel barn equipment and farm appliances.

Atkinson & Frank, Sparta, Wis., have purchased a site for a new garage and machine shop, 60 x 130 ft., which will cost about \$20,000 complete.

The Avery Co., Peoria, Ill., is erecting an addition to its motor works at Milwaukee, to connect the gray iron foundry with the main machine shop so as to facilitate handling of castings. A few items of new equipment will be required. The building will cost about \$60,000 complete. Robert L. Reisinger & Co., Milwaukee, are the general contractors.

The Menominee Motor Truck Co., Menominee, Mich., which was recently acquired by interests identified with the Four Wheel Drive Auto Co., Clintonville, Wis., has elected the following officers: President, Antone Kuckuk, Shawano, Wis.; vice-president, W. A. Holt, Oconto, Wis.; secretary and treasurer, James A. Bell, Clintonville, Wis. Mr. Bell, formerly assistant general superintendent of the Four Wheel Drive factory, is general manager of the Menominee plant.

## Indianapolis

INDIANAPOLIS, Dec. 15.

The O. K. Giant Battery Co., Gary, Ind., which has completed its first unit, has awarded a contract for the erection of a second building, 100 x 200 ft. It will manufacture dry batteries.

The Graham Valve Co., which has offices and a factory ready to start operations, at Boonville, Ind., will move to Mount Vernon, Ind. It will manufacture a ball valve, invented by George Graham of Chicago.

The H. C. S. Motor Car Co., Indianapolis, recently organized with Harry C. Stutz, president, formerly at the head of the Stutz Motor Car Co., has purchased a site for a factory at Capital Avenue and Fourteenth Street. Two four-story buildings will be erected, each 80 x 205 ft., of brick and concrete construction.

The Simplex Lock Rim Co., Petersburg, Ind., recently organized with \$100,000 capital stock to manufacture a demountable rim for automobile wheels, has elected the following officers: President, Edward Scales; vice-president, John M. Loveless, and secretary-treasurer, H. R. Whitelock.

Harry A. Shaw, Racine, Wis., has been made manager of the Logansport Body Works, organized at Logansport, Ind., to manufacture automobile bodies. The company will erect a factory.

The Marine Tire & Rubber Co., Winchester, Ind., has been incorporated with \$200,000 capital stock to manufacture automobile tires. The directors are William J. Hubert, Will H. Brenner and George F. Mercier.

The Warner Corporation, Muncie, Ind., has been incorporated with \$250,000 capital stock to manufacture automobiles. The directors are John F. Warner, Warren M. Sample and Dee O. Skillen. The Warner Mfg. Co. has been dissolved.

The Columbus Handle & Tool Co., Columbus, Ind., has added \$75,000 to its capital stock, making a total of \$175,000.

The Edwards Valve & Mfg. Co., East Chicago, Ind., which had extensive war contracts, will manufacture electric washing machines.

The Vulcan Implement Factories Co., Evansville, Ind., has been organized by officials of the Vulcan Plow Co., to manufacture motor-driven farm machinery. The plow organization will continue in the production of horse-drawn farming implements.

The Indiana Smelting & Refining Co., Indianapolis, is planning larger quarters as its business grows. It is the only concern in the State manufacturing babbitt and type metals and was organized less than a year ago. Max Robbins is president.

The Studebaker Corporation, South Bend, Ind., manufacturer of automobiles, wagons, carriages, etc., has increased its capital stock from \$45,000,000 to \$90,000,000.

## Cincinnati

CINCINNATI, Dec. 15.

The local machine tool industry is experiencing a period of prosperity greater than at any time since the signing of the armistice. The past month has been the best of the year, and while the effects of the coal strike may adversely affect the industry for a short time, manufacturers are looking to the future with every confidence. Most plants are sold well ahead and business is still coming in at a very satisfactory rate. One large manufacturer expects an increase in prices on some of the heavier tools about the first of the year, but the amount has not been definitely decided upon. Automotive concerns are still the chief buyers, but orders for single machines are very satisfactory. The scarcity of help continues to curtail production to some extent, and while no definite orders to go on the short week have been received, a number of the larger plants may have to do so, as their supply of coal is only sufficient to carry them over the present week. The past month the Ordnance Salvage Board disposed of \$100,000 worth of machine tools to manufacturers of this city which were crated and ready for shipment at the time of the signing of the armistice. They were taken by the builders to meet demands of some of their regular customers.

The King Machine Tool Co., Cincinnati, manufacturer of boring mills, has awarded contract to the H. C. Hazen Contracting Co. for an extension to its plant which will give an additional 30,000 sq. ft. of floor space. It will be of steel and brick with concrete floors throughout, and work will commence immediately.

The Stanley Mfg. Co., Dayton, will erect a three-story concrete addition to its plant to cost \$25,000. Frank Hill Smith, Inc., is the contractor.

The Cree-Becker Oil Tool Co., Newark, Ohio, has recently been formed with a capital of \$250,000 to carry on the manufacture of oil and gas well machinery. It is the intention to erect a steel building on the site of the Pratt-Kirke company in that city.

The Dayton Insulating Die Co. of Dayton, Ohio, has moved into its new plant in the Edgemont suburb. C. A. Kurz is president.

The new plant of the Dayton Fan & Motor Co., Dayton, is about completed and the company expects to move into its new quarters about Jan. 15.

The Vogt Brothers Mfg. Co., Louisville, Ky., manufacturer of duplex pumps, has recently completed an addition

to its plant. It has also acquired additional property and will soon commence the erection of a large foundry.

The Union Machine Co., Louisville, operating a machine works at 977 Logan Street, is planning for an addition. Some new machine tools and other equipment will be installed. The company recently increased its capital stock to \$30,000. Joseph A. Ganz is manager.

## St. Louis

ST. LOUIS, Dec. 15.

C. O. Pixley, Clarksdale, Miss., is reported in the market for about \$5,000 worth of cotton gin equipment.

The Fort Smith Light & Traction Co., Fort Smith, Ark., will construct an addition to cost about \$250,000.

The Lake Charles Machine Shop Co., Lake Charles, La., is in the market for about \$10,000 worth of machine shop equipment.

The Russell Grader Mfg. Co., Minneapolis, Minn., will erect an assembling plant at Kansas City, Mo., which will also do limited manufacturing.

The Central Electrotype Foundry Co., Kansas City, Mo., will erect a plant at a cost of \$100,000. Charles L. Smack is president.

The Liberty Auto Lock Co., 2209 Pine Street, St. Louis, E. W. Link president, will equip a plant for the manufacture of automobile locks.

The Arbuckle Refining Co., Ardmore, Okla., will erect a refinery to cost about \$500,000. F. P. Caldwell and others are interested.

The Standard Stamping Co., St. Louis, will erect a machine shop in connection with its plant.

The Schlueter Brothers Mfg. Co., St. Louis, will erect an addition to its metal working plant.

The United Drug Co., Boston, Mass., will build a factory in St. Louis for the manufacture of chemicals, etc., and will equip a power plant including boilers, engines and electrical equipment.

Kansas City, Mo., Charles Foreman in charge, will add a boiler room and a machine shop to its water works plant.

The Wood & Lane Co., Syndicate Trust Building, St. Louis, is reported in the market for two 75 to 100 kw. three-phase 60 cycle 440 volt belted generators; two 150 to 200 kw. 250 volt direct current engine generator sets; one 150 to 200 kw. three-phase 60 cycle 2300 volt generator and other electrical equipment.

The St. Joseph Structural Steel Co., St. Joseph, Mo., with works at Fourth and Franklin streets, plans the erection of a new works on Eighth Street, to cost about \$75,000.

## Texas

AUSTIN, Dec. 13.

The Donna Light & Ice Co., Donna, has increased its capital stock from \$10,000 to \$40,000 and will install additional machinery in its electric light plant, and also enlarge its ice factory.

The Kingsville Ice & Milling Co., Kingsville, has been incorporated with a capital of \$50,000 and will build an ice plant and grist mill. R. Driscoll, M. Nuckols and J. D. Finnegan are the incorporators.

The Abilene Gas & Electric Co., Abilene, which has begun the construction of an electric power station to cost \$780,000, plans to take over the electric street railway system of the city and expend about \$35,000 in improvements.

The Gulf Marine Repair Works, Texas City, will build a marine repair shop at that port. S. R. Halstead is interested.

The Fort Worth & Mineral Wells Railway and the Fort Worth, Mineral Wells & Breckenridge Railway Association, allied corporations, are promoting the construction of an interurban electric railroad between Fort Worth and Breckenridge, about 115 miles, with branch lines to Eastland, Ranger and Cisco. Both companies have principal offices in Fort Worth, with H. E. Robinson president. The project involves the construction of a central electric power station.

E. W. Hartman, Fort Worth, and associates are organizing a company with a capital stock of \$10,000,000 to construct a natural gas pipe line from the Caddo field of Louisiana to Fort Worth, Dallas and other Texas towns.

The Texas Union Packing Co. and the Texas Union Stockyards Co., allied corporations, have purchased a tract of 60 acres on the Ship Channel, near Houston, upon which they will build a meat-packing plant to cost \$3,000,000. Offices have been opened in Houston with W. C. Turnbow president of both companies.



## The Pacific Coast

SAN FRANCISCO, Dec. 9.

A machine shop, 30 x 40 ft.; boiler plant, 40 x 80 ft., and distillery building, 30 x 40 ft., will be erected by the Los Angeles Soap Co., First Street, near Alameda Street, Los Angeles. Morgan, Walls & Morgan, Van Nuys Building, are the architects.

The Warnerlite Co., Pasadena, Cal., has been incorporated with a capital of \$1,000,000 to manufacture automobile lighting appliances, and construction is under way on a new plant at Willis and Marengo avenues, to cost about \$100,000, including equipment. W. F. Warner, E. G. and A. E. Danielson head the company. The organization is affiliated with the company of like name at Davenport, Iowa.

The Wilmington Iron Works, Wilmington, Los Angeles, has filed notice of organization to manufacture iron and steel specialties. Anthony Martin, 912 Alamitos Avenue, and Walter C. Richards, 1068 Cerritos Avenue, both of Long Beach, head the company.

The Western Machinery Co., 900 North Main Street, Los Angeles, has filed plans for the erection of a one-story addition to its foundry.

The Board of Trustees, Whittier, Cal., will receive bids up to Jan. 5 for new boilers, pumping engines, electric generators and electric-driven centrifugal pumps for the water department. Also for a quantity of cast-iron pipe and fittings. C. L. Trueblood is clerk.

The Kinner Airplane & Motor Corporation, Los Angeles, has been incorporated with a capital of \$100,000 by Kenneth C. Barnes, C. M. Kinner and H. M. Russell, to manufacture aircraft and aircraft motors.

The Hercules Rim Tool Co., 417 Grant Building, Los Angeles, has filed notice of organization to manufacture tools and machine parts. E. T. Rushton, 427 South Hope Street, heads the company.

The Sterrett Packing Co., Portland, has recently been organized and plans the construction of a meat-packing plant which will represent an expenditure of \$500,000. Construction will start in about 30 days. George Dickson and J. L. Sterrett, Portland, head the company.

The Olympia Door Co., Olympia, Wash., plans the immediate construction of a sawmill, which will have a daily capacity of 150,000 ft.

The Aladdin Co., Portland, has purchased the plant of the Stay-Round Silo Co. and will convert it into a temporary factory for the manufacture of wood-working products. It will be doubled in size and new equipment installed.

The Barbare Brothers, Tacoma, shipbuilders, will construct a wooden shipbuilding plant.

## Canada

TORONTO, Dec. 15.

There is no falling off in the demand for machinery and tools in this market; if anything, requirements appear to be increasing. Prices of machine tools manufactured in the United States are showing an upward tendency and by the time they are laid down in Canada show advances of about 30 per cent over the levels of a few weeks ago, chiefly on account of duty and exchange. Dealers are paying keen attention to prices, and with a decided shortage of tools and the demand for used equipment on the increase, prices of rebuilt machinery are also advancing. In some cases deliveries are coming through better, but even now dealers are unable to give any definite date for delivery on new orders. High-speed tools from England are again coming on the market. Previous to the war England had practically a monopoly of the high-speed steel trade in the Dominion, but owing to the demand at home and the inability to get shipments through, the business passed largely into the hands of American firms. British manufacturers are again out to get back at least a slice of the Canadian trade, and are putting their stocks in the market in some cases at prices 10 per cent better than the local quotations. Practically all classes of machinery and tools are in demand, and municipal and Government undertakings are calling for large quantities of equipment. T. L. Church, chairman of the Board of Control, Toronto, is receiving bids until Feb. 10 for one or more 16,000,000 to 20,000,000 Imperial gal. centrifugal pumps for installation at the main pumping station. John T. Reid, town clerk, Campbellton, N. B., is in the market for a direct-connected electrically driven 600-Imperial gal. per min. centrifugal pump, 150 lb. pressure, also motor, 220 volts, 60 cycle. The Toronto Lock Mfg. Co., Patterson Place, Toronto, is in the market for a 1/4-in. high-speed riveter. Napanee, Ont., will shortly make improvements to its waterworks and will require pumps and other equipment.

E. A. Wilson, of the Ingersoll Machine Co., Ltd., Ingersoll, Ont., has become associated with the John Morrow Screw &

Nut Co., Ltd., as vice-president and joint manager, co-operating with J. A. Coulter, head of the John Morrow Screw & Nut Co. The John Morrow company has purchased an interest in the Ingersoll company and the American Machine Products Co., Inc., Detroit, Mich., and will operate them, together with the Ingersoll File Co., as subsidiary concerns to the John Morrow Screw & Nut Co. The plant of the Ingersoll Machine Co. is being improved and about \$50,000 worth of new machinery is being installed for the manufacture of a new line of tools. Col. F. H. Beacon, Toronto, is honorary president and director of the board.

Construction has started on the new plant at Hamilton, Ont., for the Firestone Tire & Rubber Co. of Canada, Ltd., recently incorporated with a capital stock of \$5,000,000. It is expected that the plant will be in operation in about six months and will have a daily capacity of 3500 tires and employ a force of 2000. It will be constructed on the unit plan to allow for expansion, and in addition to the products turned out at the parent plant at Akron, Ohio, the Canadian company will manufacture a line of mechanical goods, including belting, etc. Plans are now being prepared for the erection of a building for the manufacture of steel rims, construction to be started at an early date.

Anglin-Norcross, Ltd., 65 Victoria Street, Montreal, has the general contract for an addition to the premises of the Canada Hart Accumulator Co., St. Johns, Que., to cost \$25,000.

The Reliance Fuse Co. of Canada, Ltd., is making arrangements for the erection of a plant at Bridgeburg, Ont. A. W. Plumley, Mutual Life Building, Buffalo, N. Y., is interested.

Ross & McDonald, 1 Belmont Street, Montreal, are preparing plans for a factory at Halifax, N. S., for the Alaska Bedding Co., 400 St. Ambroise Street, Montreal.

Tremblay & Dufour, Ltd., Chicoutimi, Que., has been incorporated with a capital stock of \$50,000 by Ernest Roy, Romeo Langlais, Armand Lavergne and others, all of Quebec, to manufacture agricultural implements, etc.

The Canadian Nathan, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Henry A. Burbidge, John R. Marshall, Arthur B. Turner and others, all of Hamilton, Ont., to manufacture and deal in plant, machinery, tools, engines, motive power appliances, etc.

Soren Brothers, 549 King Street West, Toronto, manufacturers of sheet metal products, etc., will call for bids shortly for the erection of a plant to cost about \$200,000.

Crane, Ltd., 88 Terauley Street, Toronto, manufacturer of machinery, cranes, etc., will build a manufacturing plant to cost \$200,000.

The Hanover Portland Cement Co., Hanover, Ont., will build a quarry at Walkerton, Ont., and install machinery to cost \$200,000.

The Brazil Motors Co., Brazil, Ind., is making preparations for the erection of a factory at Welland, Ont.

The Eastern Canada Motor Truck Co. has awarded the general contract to Ross, Meagher & Co., Elgin Street, Ottawa, Ont., for the erection of a factory at Hull, Que. Richards & Abra, 126 Sparks Street, Ottawa, are the architects.

The Western Motors Co., Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Alfred W. Briggs, Room 50, 33 Richmond Street West; Roy W. Lent, Edna M. Kingdon and others, to manufacture automobiles, tractors, farm implements, etc.

The Bishop-Barker Aeroplanes, Ltd., Toronto, has been incorporated with a capital stock of \$300,000 by Joseph G. Gibson, 67 Yonge Street; Thomas Gibson, Henry C. Draper and others to manufacture aeroplanes, motors, engines, etc.

Machinery & Supplies, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Henry H. Davis, 143 Bloor Street West; James S. Beatty, Room 25, 10 Adelaide Street East; John R. Rumball and others, to manufacture mill supplies, engines, electrical appliances, tools, etc.

The Charles F. Goad Engineering Co., Ltd., Toronto, has been incorporated with a capital stock of \$300,000 by Goldwin L. Smith, 2 Wellington Street East; Thomas B. Richardson, John R. Cartwright and others, to manufacture electrical equipment, automobile supplies, etc.

The Gear Products of Canada, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of \$250,000 by George H. Allington, Harvey T. Harrison, both of St. Catharines, Ont.; William G. Tingle, 12 Laurien Avenue, Toronto, and others, to manufacture gears, gear cases, cutters, axles, etc.

Simmons, Ltd., Montreal, has been incorporated with a capital stock of \$10,000,000 by William S. Morlock, 55 Bay Street; Sydney E. Wedd, 162 Jameson Avenue; Roy B. Whitehead and others.

## OFFICE CHANGES

The Canadian Trade Corporation, Ltd., Montreal and London, announces the opening of a temporary branch office at 1457 Broadway, New York, under the management of Charles T. Stork and C. W. Moody.

The Penn Seaboard Steel Corporation, 1417 Sansom Street, Philadelphia, has appointed the Admiral Anchor Co. selling agents for the Admiral stockless anchor, mooring, and old style stock anchors.

The J. I. Case Plow Works, Racine, Wis., and the Wallis Tractor Co., Racine, Wis., have merged under the name of the former company. The new company has a paid in capital of more than \$7,000,000. H. M. Wallis is president.

The name of the St. Louis Metalware Co., St. Louis, has been changed to the Neidringhaus Metalware Corporation. Officers of the company are: R. L. Niedringhaus, president; Warne Niedringhaus, vice-president; O. E. Niedringhaus, treasurer; and Thomas Connors, secretary.

The Hammond Steel Co., Inc., Syracuse, N. Y., manufacturer of electric tool and alloy steels, is completing the installation of 16 in. and 10 in. rolling mills, straightening machinery, turning equipment, electric furnaces and annealing plants in the mills at Solvay, N. Y. Following the completion of this work, the company plans the erection of a plant for cold drawing.

The Yeomans Brothers Co., Chicago, electric pumping machinery, has removed from 231 Institute Place to its new building at 1433 Dayton Street.

The Sterling Blower Co., Hartford, Conn., manufacturer of blowers and blower systems, has established an engineer and corps of erecting mechanics in Philadelphia.

A New York office has been opened by the Pittsburgh Screw & Bolt Co., Pittsburgh, at 50 East Forty-second Street. J. Allen Dillon is in charge of the New York office.

W. K. Mitchell & Co., Inc., Philadelphia, steam engineers and contractors, announce the election of W. R. Newgeon to succeed J. A. Harris, Jr., as president, and G. P. Mitchell as treasurer. E. Zahn was re-elected vice-president.

The J. T. Tractor Co., Cleveland, has removed its administrative offices to the new plant, the first unit to be completed of several buildings which will occupy a six-acre site at 1516 Fairfield Road.

Avery & Saul, sheet metals, Boston, are now located in their new warehouse, 297-299 Dorchester Avenue, South Boston.

The Keystone Screw Co., Philadelphia, has removed from Seventeenth and Lehigh avenues to the Fuller Building.

The Hyatt Roller Bearing Co., New York, has opened an office of the industrial bearings division in Cleveland, 309 Marshall Building. C. L. Newby is the manager of the new office.

The Nivin Mfg. Co., Chicago, manufacturer of the Nivin Metal Parts Washing Machine, has changed its name to the Crescent Washing Machine Co., and the machine will be known as the Crescent instead of Nivin.

Hamilton & Hansell, Inc., 13 Park Row, New York, will hereafter devote itself to metallurgical and general engineering work. In conjunction with domestic work, the company will carry on development of foreign patents and enterprises. A separate company, the American Transmarine Co., has taken over the general export and import business not relating to engineering. For five years Hamilton & Hansell have been licensees and builders of the American Rennerfelt electric furnace for ferrous and non-ferrous work and have

also designed a number of electric reduction and electro-chemical plants. Contracts closed in the last three months include a 1000-lb. 200-kva. Rennerfelt furnace for special iron for A. M. Byers Co., Pittsburgh; 200-kva. Rennerfelt furnace for glazing used silica, General Ceramic Co., Perth Amboy, N. J.; 4-ton 1200-kva. furnace for tool steel for export to Sweden; 300-lb. 100-kva. furnace for aluminum alloys, Bauch Machine Tool Co., Springfield, Mass., and two 1000-lb. 200-kva. furnaces for high speed steel cast tools for U. S. High Speed Steel & Tool Corporation, Albany, N. Y.

The Swan & Finch Co., maker of oils and greases, including the Atlas lubricants, 165 Broadway, New York, has bought the interests of the Cataract Refining & Mfg. Co., and the products of both companies will be available through Swan & Finch offices and through the Cataract offices in San Francisco, Toronto, and London, England.

The Sizer Forge Co., 244 Larkin Street, Buffalo, has opened a district sales office at 495 Book Building, Detroit, in charge of L. D. Stanton.

The Erie Engine Works, Erie, Pa., has opened a Philadelphia sales office at 1304 Pennsylvania Building, in charge of Otto C. Reymann.

The National Ignition Co., Inc., is the new name of the National Clutch Co., Irvington-on-Hudson, N. Y. No change has been made in officers or policies.

The Hooven, Owens, Rentschler Co., Hamilton, Ohio, manufacturer of steam engines, compressors and radiators, with offices in Atlanta, Ga., Chicago, New York, St. Louis and Pittsburgh has opened branches in Philadelphia and Richmond, Va. The Philadelphia office, 2129 Land Title Building, is in charge of C. M. Decker, formerly of the R. D. Wood Co., and the Richmond office is in charge of E. H. Fairchild, formerly of the C. & G. Cooper Co. Henry E. Balsley, formerly of the American Bridge Co., has been appointed manager of the Chicago office and E. S. Cooley, the Fore River Shipbuilding Co., is in the New York office. R. C. Holman, previously with the General Electric Co., is now in charge of all blowing engines.

The Vulcan Crucible Steel Co., Aliquippa, Pa., makers of high grade tool and alloy steels, has opened an office at No. 30 Church Street, New York, under the management of T. S. Hanna. Mr. Hanna formerly represented the Howe Brown Co. and later the Colonial Steel Co. in the New York district, also Wm. Jessop & Sons in Boston.

The Rhode Island Crucible Steel Co., Pawtucket, R. I., has bought property on South Maine and Tockwotton streets, Providence. Its equipment is being moved to the new quarters and the management hopes to have the new plant in operation by Jan. 1. The company will have approximately four times as much room in its new quarters as it has in its present.

The American Safety Razor Export Corp. announces that it has opened offices in England and France to handle the distribution of the company's product in Europe.

The Port of Birmingham Corporation, which is to build terminals at Short Creek on the navigable Warrior River, 15 miles from Birmingham, Ala., has been financed, contracts for the work let and J. W. McWane president American Cast Iron Pipe Co., elected president. Connection between Birmingham and the river is afforded by two highways and the Ensley Southern railroad. The Tennessee Coal, Iron & Railroad Co. was greatly interested in the movement and contributed 25 per cent of the funds. The company is regularly moving fabricated steel shapes from its Fairfield mills down the Warrior River in barges direct to the shipbuilding yards of its auxiliary, the Chickasaw Shipbuilding Co.

The Sloss-Sheffield Steel & Iron Co. has begun the erection of a power house at its new by-product works now building at North Birmingham, Ala., and will furnish power to operate mines by electricity from that plant.



## SHORT TRADE ITEMS

The American Crane Co. Inc., has recently been organized and has taken over the manufacturing interests of the Barber-Foster Engineering Co., Friendship, N. Y. The plant is being enlarged and equipped with additional new equipment to build the monorail hoists, standard and special electric traveling cranes which the Barber-Foster Engineering Co. has developed. The Barber-Foster company will act as exclusive distributor and will give particular attention to the design and development of special hoisting equipment.

A. H. & F. H. Lippincott, manufacturers of screw machine products, have purchased the assets of the Carlson-Wenstrom Co. and the Carwen Tool & Steel Co., Philadelphia, and will continue, under the direct supervision of A. H. & F. H. Lippincott, the manufacture of the Carwen dynamic balancing machine in conjunction with their screw machine product business on a much larger scale. Joseph A. Ganster will be associated with the corporation as director and works manager, and Jacob Lundgren as engineer. The business will be conducted under the corporate name of Lippincott-Carwen Corporation.

The Perfecting Machine & Castings Co., Inc., 127 West Fourth Street, Michigan City, Ind., has purchased the plant and equipment of the Northern Foundry Co., La Porte, Ind. A. Sorge, Jr., holds the major portion of the stock of the new corporation, and George A. Giles is in charge of the plant. Fred H. Krause, one of the original incorporators of the Northern Foundry Co., has been retained as head of the production department. The foundry started with four-ton heats daily, but the output will be quadrupled as soon as the necessary facilities can be provided.

The United States Civil Service Commission announces an examination for structural steel inspector to fill a vacancy at the Naval Ordnance Plant, South Charleston, W. Va., at \$7.04 per day. Applicants should apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, or the secretary of the United States Civil Service Board at the nearest custom house.

The Timken-Detroit Axle Co. will increase its common stock from \$3,000,000 to \$30,000,000 and the preferred from \$1,550,000 to \$15,000,000. At present only \$5,000,000 in preferred stock will be issued, a portion to be used for the redemption of stock now outstanding and to redeem notes issued during the war. The remainder of the issue will be used for expansion. A new machine shop is now being erected in connection with the Canton plant.

The National Roll & Foundry Co., Avonmore, Pa., has received a contract for a new sheet mill installation for the Follansbee Bros. Co., Pittsburgh, to be built at Toronto, Ohio. This consists of 10 roughing mills, 10 hot finish sheet mills, 10 stands of cold rolls and all other necessary equipment, including a two-high reversing sheet bar mill with tables and cooling beds. The National Roll & Foundry Co. is also building all the hot roll equipment for the new tin mill plant of the Eastern Rolling Mill Co., near Baltimore.

The Steelduct Co. recently organized at Youngstown, Ohio, with a capital of \$100,000, will manufacture rigid steel conduits, both galvanized and enameled. Its plant is located at Mineral Ridge, Ohio. William B. Curtis, is president and J. L. Logan, III, is vice president and secretary.

A foreign trade service, to be conducted by a special staff, has been established by the National Federation of Construction Industries, Drexel Building, Philadelphia. It has in operation already a clearing house of information, and specific inquiries in its line are welcomed.

The Austin Co., Cleveland, has taken a contract for the erection of a foundry 100 x 200 ft., a cupola and a core oven building for the Monarch Foundry Co., Detroit. The same company has recently taken an order for a 3-story building 60 x 192 ft. for the Ames-Bonner Co., Toledo, and a rolling mill plant 230 x 260 ft. for the Standard Tinfoil Co., Philadelphia.

Victor E. Karminski & Co., Inc., 291-295 Broadway, New York, iron and steel merchants, announce the opening of London offices at 3 St. James Place, with George A. Stevenson as manager. Mr. Stevenson is also opening an office for the company in Swansea, South Wales, at Eagle Chambers, Adelaide Street, that city. For four years, Mr. Stevenson was connected with Richard Thomas & Co., manufacturers of tinplate, of Llanelly, South Wales, subsequently for three years with the Pemberton Tinplate Co., Llanelly, and still later in charge of the metal department of the Asiatic Petroleum Co., London.

The E. A. Kinsey Co., Cincinnati, suffered a fire loss Nov. 20 estimated at \$100,000. It handles machinery, machine tools and mill, mining and machine shop supplies. Very little delay to the company's business will be experienced, as salvage operations were begun immediately and new stocks ordered.

The William T. Johnston Co., Cincinnati, machinery and mill supply dealer, has let the contract for a warehouse to be constructed at Pearl and ine streets that will be used for storing heavy machinery.

The Pennsylvania Textile Co., New York, has purchased some 80,000 sq. ft. of land near its plant at Central Falls, R. I., on which it plans to erect many houses for its employees. The contract to build the homes has been let to a Pawtucket concern, and actual work is expected to start next spring.

The Eastern Tire & Rubber Co., Chelsea, Mass., with a capital of \$10,000, has been granted a Massachusetts charter to buy and sell scrap rubber and metals of all kinds. Maurice Spack, 232 Washington Avenue, Chelsea, is president.

The Greenville Steel Car Co., Greenville, Pa., will spend \$100,000 in the erection of a machine and pattern shop, an addition to the plan shop and for an office building. The company is doing the work itself, and is not in the market for equipment.

Members of the engineering and construction staffs of the J. G. White Engineering Corporation, which has been awarded the contract for 225 miles of the White Oil Corporation's pipe line, have just returned from Texas after making a local inspection and survey of the proposed route.

The Lumen Bearing Co., Buffalo, has taken out a permit for the erection of a foundry building at Youngstown, Ohio, at an estimated cost of \$25,000. It will be 105 x 142-ft., one story.

Contracts for several factory buildings have been placed recently with the Austin Co., industrial engineer and builder, Cleveland. These include a three-story addition 80 x 144 ft., estimated cost \$100,000, for the Illinois Watch Co., Springfield, Ill., an addition to the plant of the Parish Mfg. Co., Detroit, 88 x 280 ft., estimated cost \$55,000, addition 80 x 100 ft. to the plant of the Standard Screw Products Co., Detroit, a foundry 90 x 80 ft., and cupola for the Burd High Compression Ring Co., Rockford, Ill., a reinforced concrete building 50 x 100 ft., for C. H. Wilson, New York, and a warehouse 60 x 142 ft. for the Cleveland Metal Products Co., Cleveland.

A pulverized coal boiler installation is to be made for the Fushun Colliery, South Manchuria Railways, Japan. A contract has been placed with the Bonnot Co., Canton, Ohio, for an equipment for six 800-hp. boilers with the Holbeck system.

A three high 28-in. billet mill to be installed by the Bethlehem Steel Co. at its Saucon plant, Bethlehem, Pa., will have Hyatt roller bearings. The mill is being built by the Morgan Engineering Co., Alliance, Ohio.

## NEW TRADE PUBLICATIONS

**Steel Windows.**—Truscon Steel Co., Youngstown, Ohio. Catalog, 80 pages, 8½ x 11 in. Describes the company's standard line of steel windows. The book deals with pivoted windows, continuous steel sash and operator for continuous sash, and counterbalanced types of steel windows. The catalog is profusely illustrated, detailed views and steel window installations being shown.

**Zinc and Its Products.**—New Jersey Zinc Co., 160 Front Street, New York. Five booklets with the titles, "Chemicals," "Metals," "Rolled Zinc," "Zinc Dust" and "Pigments," respectively. "Chemicals" describes various grades of sulphuric acid, muriatic acid, zinc chloride and salt cake. "Metals" gives descriptions and analyses of various grades of slab zinc, also mentions spiegeleisen and bullion. "Rolled Zinc" and "Zinc Dust" describe these products. "Pigments" deals with various brands of zinc oxide made under the French and American processes, ochre and lithopone.

**Cylinder Testing Gage.**—Federal Products Corporation, 393 Harris Avenue, Providence, R. I. Pamphlet. Describes a gaging apparatus equipped in the dial for measuring the diameter of automobile engine cylinders. The device is illustrated and described.

**Building Construction.**—Austin Co., Cleveland. Catalog 9. Outlines the scope of the Austin construction and equipment service, and contains cross sections of the 10 Austin standard type of buildings. A description of the Austin service to foundry and steel plant owners is included.

**Building Construction.**—Blaw-Knox Co., Pittsburgh. Booklet. Describes in detail and gives illustrations of the various steel form for reinforced concrete floors and roofs used in the Blaw system of building construction. Views showing methods of using the different forms are included.

**Structural Pressed Steel.**—Truscon Steel Co., 58 Lafayette Boulevard, Detroit. Catalog, 23 pages, 8½ x 11 in. Illustrates and describes the use of pressed steel I beams, channels, metal lath, etc., for floors, roofs, walls and partitions. Lightness and fire resistance are the features emphasized for this construction.

**Oil Engines.**—Skandia Pacific Oil Engine Co., Balboa Building, San Francisco, Cal. Catalog. Illustrations with specifications and descriptions of the company's heavy duty marine and stationary oil engines.

**Marine Boilers.**—Heine Safety Boiler Co., St. Louis. Booklet with the title "Marine Boiler Logic," 58 pages, 6 x 9 in. Deals with the fundamental design of marine cargo carriers. Consideration is given to the design and construction of water tube boilers for marine purposes, and power and speed of cargo vessels are discussed. The catalog is profusely illustrated.

**Flexible Shaft Grinding Machine.**—Edward Gordon, 749 West End Avenue, New York. Pamphlet. Concerned with a motor driven flexible shaft equipped with scraping burrs and grinding wheels for grinding, sanding, buffing or pattern scraping.

**Welding Repairs.**—Wilson Welding Repair Co., Ltd., 2 Rector Street, New York. Booklet. Shows repairs, including some of those on the interned German ships, made by the company's system of "Plastic-Arc" welding.

**Metal Working Machinery.**—Allied Machinery Co. of America, New York. Catalog illustrates and describes threading machines made by the Automatic Machine Co., Bridgeport, Conn.; also boring machines made by Lucas Machine Tool Co., Cleveland, Ohio.

**Storage Outfits for Lubricants.**—S. F. Bowser & Co., Inc., Fort Wayne, Ind. Folder. Describes tanks and other equipment for the storage of lubricants. Four tanks of varying capacity arranged in battery are shown.

**New and Relaying Rails.**—Walter A. Zelnicker Supply Co., St. Louis. Bulletin 266. Lists a stock of new and relaying rails, portable track, angle and splice bars, crossings, frogs, ties, etc.

**Contractor Locomotive Cranes.**—Edward F. Terry Mfg. Co., Grand Central Terminal, New York. Bulletin 5. Describes a contractor locomotive crane made in three types, each type having two capacities as follows: 6 and 8 tons, 10 and 13 tons, 15 and 20 tons. The catalog is illustrated.

**Automatic Ore Unloaders.**—Weilman-Seaver-Morgan Co., Cleveland. Bulletin 27. Describes the company's automatic ore unloaders. The buckets are of large capacity and are positively guided in passing through the hatches of the ship. The operator travels with the bucket into the boat.

Views show the machines at work unloading ore steamers at various docks.

**Drops Forgings.**—Page Storms Drop Forge Co., Chicopee, Mass. Catalog, 80 pages, 5 x 8 in. Concerned with an extensive line of drop forged wrenches. Specifications and illustrations of the different types of wrenches are included.

**Motor Trucks.**—Indiana Truck Corporation, Marion, Ind. Catalog. Illustrations and specifications of motor trucks made of 1, 1½, 2, 3½ and 5 tons capacity.

**Belt Grinding Machinery.**—T. P. Walls Tool & Supply Co., Inc., 75 Walker Street, New York. Catalog. Devoted to a line of belt grinding machinery which includes band grinders, band and disk grinders, emery band and disk grinders, double belt automatic polishing machines, etc.

**Cutting Torch for Trimming and Beveling Boiler Flanges.**—Davis-Bournonville Co., Jersey City, N. J. Catalog. Describes the "Pyrograph," an oxy-acetylene torch equipped with a mechanism to guide the torch man when trimming and beveling boiler sheets. Details of the machine and methods of operation are described and illustrated.

**Propellers.**—Thacher Propeller & Foundry Corporation, Albany, New York. Catalog. Gives views and explains the virtues of propellers made by the company's "Thacher" process.

**Steam Ash Conveyors.**—American Steam Conveyor Corporation, 110 West Fortieth Street, New York. Pamphlet. Explains a system whereby the ashes are raked into a pipe and removed by steam. A 160-page book with the title "Modern Methods of Ash Disposal" issued by the company is described.

**Foundry Mixers.**—National Engineering Co., 549 West Washington Boulevard, Chicago. Circular 50. Concerned with foundry mixers made in three sizes with pans measuring 3, 4 and 6 ft. in diameter. The machines are illustrated.

**Transformers.**—Wagner Electric Mfg. Co., St. Louis. Bulletin 119. Concerned with distribution type transformers made in shell and core type. Details of construction and assembled views are shown.

**Machinery Building.**—Taft-Peirce Mfg. Co., Woonsocket, R. I. Bulletin 108, 47 pages, 8 x 10½ in. Describes the company's contract service for the developing and building of special machines, special tools and other equipment used in the manufacture of interchangeable machine parts, and for the manufacture of individual parts or complete mechanism in quantity to the client's plans and specifications. Numerous views showing equipment throughout the company's plant are given.

**Oil Hole Covers.**—W. W. & C. F. Tucker, Hartford, Conn. Catalog 6. Illustrates and describes oil hole covers made in different sizes and styles.

A copy of a new publication of the Bureau of Standards, Technologic Paper No. 139, "Some Tests of Light Aluminum Casting Alloys; the Effect of Heat-treatment," discusses the mechanical properties of a number of different compositions of cast light aluminum alloys. These have been determined as well as the resistance to the action of alternating stresses of three commonly used alloys. Comparison has been made of the resistance of some well-known alloys to corrosion in the salt spray test. It is found that the effect of heat-treatment of cast alloys, consisting of annealing at 500 deg. C. and cooling in air from that temperature, followed by aging for several days before testing, produces an increase in the tensile strength and the hardness, with an attendant decrease, usually, in the elongation. The application of such a heat-treatment to light aluminum castings seems to have commercial possibilities.

The American Ore Reclamation Co., New York, has published a booklet dealing with the sintering and desulphurizing of iron ore materials. The booklet is well illustrated with microscopic photographs of various types of sinter, drawings illustrating the operation of the sintering process and photographs of plants in operation. Statistics are also given which show the results of sintering flue dust, pyrites cinder, magnetic concentrates, and Mayari ore. The American Ore Reclamation Co. controls the Dwight & Lloyd patents for continuous down-draft sintering and also licenses plants to use the Heberlein up-draft process and the intermittent process of sintering with separate tilting pans. The book concludes with a series of drawings to scale of different types of sintering machine plants.



## BOOK REVIEWS

### American Foreign Trade. By Charles M. Pepper.

Pages, 342, 5¼ by 8 in.; with maps. Published by the Century Co., 353 Fourth Avenue, New York.

The advancement of the United States to the foremost position in international commerce, brought about by the momentous changes wrought by the world war in the economic and financial structure of European nations, has evoked an outpouring of literature on our trade relations with other countries. Much of this literature has been of a practical character, written by men conversant with commercial conditions abroad. They have thus sought to assist our manufacturers and merchants to secure a permanent footing in the enlarged field of operations which has so fortuitously been opened to them. Mr. Pepper, former foreign trade adviser to the Department of State, who is thoroughly familiar with trade developments in recent years, has made a most important contribution to the practical class of foreign trade literature. The purpose of the work is to give information. It is a survey of world markets and the nature of the trade which constitutes them. The information thus presented comprises the resources, the industries and the trade of the several sections of the world and the economic tendencies and fiscal policies of the nations, which form the basis necessary to an intelligent survey of the entire field of foreign commerce. The author's style is clear and direct and he has developed his subject in a highly interesting way.

The book is not a mere compilation of statistics, nor is it a directory of industrial and commercial establishments, but it is a compendium of commercial information interwoven with historical facts concerning treaties and international financial relations which should be known and properly appreciated by those seeking trade in countries with whose customs and methods they are wholly unfamiliar. It is the author's belief that the American spirit in developing world trade will be strongest under the individual impulse.

### Electrical Engineering Papers. By Benjamin G. Lamme. Pages 773, 6 x 9 in.; numerous illustrations. Published by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

This is a collection of the author's most important engineering papers presented before various technical societies and published in engineering journals and elsewhere from time to time. They have been collected and issued in volume form by the Westinghouse company, on the anniversary of Mr. Lamme's first connection with the company, 30 years ago.

The collection begins with an early paper on the polyphase induction motor, which, in its time, was a primer of the characteristics and operation of such motors in the hands of the numerous users of these machines. The second paper was a noteworthy one presented in 1902 before the American Institute of Electrical Engineers in New York on the single-phase system of the Washington Baltimore & Annapolis Railway. This paper discussed the first great and successful attempt to break away from the established practice of utilizing 600 volts of direct current by employing materially higher trolley voltages.

Other contributions follow on a 10,000 cycle alternator, on the synchronous motor for regulation of power factor, and on single-phase motors. Other papers presented before the American Institute of Electrical Engineers from time to time cover the subjects of commutation, homopolar dynamo, rotary converters, turbo generators, losses in electrical machinery, and engineering education.

To all those who have followed the development of electrical engineering in America during the past 30 years, and to those who would like to know the historical development of electrical apparatus, the series of papers which appeared in the *Electric Journal* on the history of the railway motor, the direct-current gen-

erator, the alternating-current generator, and the history of the frequencies, will provide interesting reading. In these, Mr. Lamme recounts his own work and that of his associates.

Besides his achievements in the art of engineering, Mr. Lamme has been gifted with a faculty for clear expression and explanation; gifts that will be highly appreciated especially by the student who is studying what is necessarily in many cases rather difficult technical subjects.

### Foundry Practice. By R. H. Palmer. Pages XVII+390, 5¼ x 8 in.; numerous illustrations. Published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York.

This is the second edition, partly rewritten and enlarged, of this book first published in 1911 and originally written to follow the scheme of instruction used by the author while instructor in foundry practice at the Worcester Polytechnic Institute. The value of the book as an aid to molders and apprentices has been considerably increased by additional information and illustrations on more difficult casting work. A number of articles which appeared in the *Foundry*, including the method to be pursued in casting large propeller wheels economically, casting locomotive superheater cylinders, and casting locomotive slide valve cylinders have been included in this second edition. Other new material includes casting lathe beds and chilling the ways, making cores for gasoline engine and automobile cylinders, and molding large kettles such as used by manufacturers of chemicals, dye stuffs, etc.

Beginning with the simplest type of mold, the reader is taken gradually through the more difficult lines of work in green and dry sand and loam. From the many possible examples which might have been used to illustrate the different practices, only those typical of the class of work to which they belong have been selected. Instead of burdening the early chapters, describing the actual molding operations with descriptions of the tools and equipment of the trade, these essentials are concentrated in one chapter which is supplemented by a glossary of terms peculiar to foundry practice. Chapters which, though brief, add to a comprehensive knowledge of the subject include molds for steel castings, treatment of castings while cooling, molding machines, mending broken castings, iron and its composition, the cupola and its operation, the air-furnace and its operation, the brass foundry, and foundry equipment. An appendix contains many tables useful in foundry practice.

"The Orifice as a Means of Measuring Flow of Water Through a Pipe" is the subject of bulletin No. 109, published by the University of Illinois, Urbana, Ill. It gives the results of tests made to determine the practicability of measuring the flow of water by means of the thin-plate circular orifice inserted in a pipe, the experimental coefficients for calculating the velocity of the flow in the pipe and the discharge, and the conditions most favorable to the use of such an orifice as a flow measuring device. It is explained that the orifice inserted in a pipe line is looked upon more especially as a temporary or field device for measuring the flow of water through a pipe, being applicable in testing the efficiency of certain forms of pumps, in determining the water consumption for individual purposes in mills and factories, in distributing water for irrigation purposes, etc. The authors are Raymond E. Davis, associate in civil engineering, and Harvey H. Jordan, assistant professor in general engineering drawing. Copies of the bulletin can doubtless be had by addressing the Engineering Experiment Station, Urbana, Ill.

"Tests on the Holding Power of Railroad Spikes," by Albin H. Beyer and William J. Krefeld, is the subject of bulletin No. 1 issued by the Civil Engineering Testing Laboratories, Columbia University, New York. The paper describes a series of experiments made on the holding power of certain railroad spikes under varying conditions and in different kinds of ties. Three kinds of spikes were tested: Cut spike with chisel point, screw spike and Sessler grip spike.

# Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

## Iron and Soft Steel Bars and Shapes

Bars:	Per lb.
Refined iron, base price.....	3.37c. to 4.00c.
Swedish bars, base price.....	20.00c.

## Soft Steel:

$\frac{3}{4}$ to $1\frac{1}{2}$ in., round and square.....	3.52c. to 3.62c.
1 to 6 in. x $\frac{3}{4}$ to 1 in.....	3.52c. to 3.62c.
1 to 6 in. x $\frac{1}{4}$ to $\frac{5}{16}$ .....	3.62c. to 3.72c.
Rods— $\frac{5}{8}$ and $1\frac{1}{16}$ .....	3.42c. to 3.67c.
Bands— $1\frac{1}{2}$ to 6 x $\frac{3}{16}$ to No. 8.....	4.22c. to 4.32c.

## Shapes:

Beams and channels—3 to 15 in. ....	3.47c.
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## Angles:

3 in. x $\frac{1}{4}$ in. and larger.....	
3 in. x $\frac{3}{16}$ in. and $\frac{1}{2}$ in.....	3.72c. to 3.97c.
$1\frac{1}{2}$ to $2\frac{1}{2}$ in. x $\frac{1}{2}$ in.....	3.52c. to 3.77c.
$1\frac{1}{2}$ to $2\frac{3}{4}$ in. x $\frac{3}{16}$ in. and thicker...	3.47c. to 3.72c.
1 to $1\frac{1}{4}$ in. x $\frac{3}{16}$ in.....	3.52c. to 3.77c.
1 to $1\frac{1}{4}$ in. x $\frac{1}{2}$ in.....	3.57c. to 3.82c.
$\frac{3}{4}$ x $\frac{3}{4}$ x $\frac{1}{2}$ in.....	3.62c. to 3.87c.
$\frac{3}{4}$ x $\frac{1}{2}$ in.....	3.67c. to 3.92c.
$\frac{5}{8}$ x $\frac{1}{2}$ in.....	4.07c. to 4.72c.
$\frac{1}{2}$ x $\frac{3}{32}$ in.....	5.17c. to 5.42c.

## Tees:

1 x $\frac{1}{2}$ in.....	3.87c. to 4.12c.
$1\frac{1}{4}$ in. x $1\frac{1}{4}$ x $\frac{3}{16}$ in.....	3.77c. to 4.02c.
$1\frac{1}{2}$ to $2\frac{1}{2}$ x $\frac{1}{4}$ in.....	3.57c. to 3.82c.
$1\frac{1}{2}$ to $2\frac{1}{2}$ x $\frac{3}{16}$ in.....	3.57c. to 3.82c.
3 in. and larger.....	3.52c.

## Merchant Steel

Tire, $1\frac{1}{2}$ x $\frac{1}{2}$ in. and larger.....	Per lb.
Toe calk, $\frac{1}{2}$ x $\frac{3}{8}$ in. and larger.....	4.25c.
Open-hearth spring steel .....	6.00c.
Standard cast steel, base price.....	14.00c.
Extra cast steel.....	18.00 to 20.00c.
Special cast steel.....	23.00 to 25.00c.

## Tank Plates—Steel

$\frac{1}{4}$ in. and heavier.....	Per lb.
	3.67c.

## Sheets

### Blue Annealed

No.	Per lb.
No. 10 .....	5.07c. to 5.80c.
No. 12 .....	5.12c. to 5.85c.
No. 14 .....	5.17c. to 5.90c.
No. 16 .....	5.27c. to 6.00c.

### Box Annealed—Black

Nos.	Soft Steel C. R., One Pass, per lb.	Wood's Refined, per lb.
Nos. 18 to 20.....	6.30c. to 6.80c.	
Nos. 22 and 24.....	6.35c. to 6.85c.	7.80c.
No. 26 .....	6.40c. to 6.90c.	7.85c.
No. 28 .....	6.50c. to 7.00c.	8.00c.
No. 30 .....	6.70c. to 7.20c.	

No. 28, 36 in. wide, 10c. higher.

### Galvanized

No.	Per lb.
No. 14 .....	6.85c. to 8.10c.
No. 16 .....	7.00c. to 8.25c.
Nos. 18 and 20.....	7.15c. to 8.40c.
Nos. 22 and 24.....	7.30c. to 8.55c.
No. 26 .....	7.45c. to 8.70c.
No. 27 .....	7.60c. to 8.85c.
No. 28 .....	7.75c. to 9.00c.
No. 30 .....	8.25c. to 9.50c.

No. 28, 36 in. wide, 20c. higher.

### Corrugated Roofing, Galvanized

$2\frac{1}{2}$  in. corrugations, 10c. per 100 lb. over flat sheets.

## Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per lb.
Bright basic .....	5.50c.
Annealed soft .....	5.50c.
Galvanized annealed .....	6.00c.
Coppered basic .....	6.00c.
Tinned soft Bessemer .....	7.50c.

\*Regular extras for lighter gages.

## Brass Sheet, Rod, Tube and Wire

### BASE PRICE

High Brass Sheet.....	27 $\frac{1}{2}$ c. to 28 $\frac{1}{2}$ c.
High Brass Wire.....	27 $\frac{1}{2}$ c. to 28 $\frac{1}{2}$ c.
Brass Rod .....	25 $\frac{3}{4}$ c. to 28 c.
Brass Tube .....	41 $\frac{1}{2}$ c. to 43 c.

## Copper Sheets

Sheet copper, hot rolled, 16 oz., 32c. per lb. base.  
Cold rolled, 14 oz. and heavier, 1 $\frac{1}{4}$ c. per lb. advance over hot rolled.

## Tin Plates

Bright Tin	Grade	Grade	Coke—14x20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal	80 lb....	\$9.30	\$9.05
	14x20	14x20	90 lb....	9.40	9.15
			100 lb....	9.50	9.25
IC...	\$15.00	\$13.00	IC...	10.00	9.75
IX...	17.25	15.00	IX...	11.25	11.00
IXX...	19.00	16.75	IXX...	12.25	12.00
IXXX...	20.75	18.50	IXXX...	13.25	13.00
IXXXX...	22.25	20.25	IXXXX...	14.25	14.00

## Terne Plates

8-lb. Coating 14x20

100 lb. ....	\$9.35
IC .....	9.50
IX .....	10.50
Fire door stock .....	12.75

## Tin

Straits pig .....	55 $\frac{1}{2}$ c. to 56 $\frac{1}{2}$ c.
Bar .....	62c. to 65c.
American pig, 99 per cent.....	56c. to 58c.

## Copper

Lake Ingot .....	20 c. to 21 c.
Electrolytic .....	19 $\frac{1}{2}$ c. to 20 c.
Casting .....	19 c. to 19 $\frac{1}{2}$ c.

## Spelter and Sheet Zinc

Western spelter .....	9 $\frac{1}{4}$ c. to 9 $\frac{1}{2}$ c.
Sheet zinc, No. 9 base, casks.....	12 $\frac{1}{2}$ c.; open 13c.

## Lead and Solder\*

American pig lead.....	7 $\frac{3}{4}$ c. to 8 $\frac{1}{4}$ c.
Bar lead .....	8 $\frac{1}{4}$ c. to 8 $\frac{3}{4}$ c.
Solder $\frac{1}{2}$ and $\frac{1}{4}$ guaranteed.....	37c.
No. 1 solder .....	33c.
Refined solder .....	28c.

\*Prices of solder indicated by private brand vary according to composition.

## Babbitt Metal

Best grade, per lb.....	90c.
Commercial grade, per lb.....	50c.

## Antimony

Asiatic .....	10c. to 10 $\frac{1}{2}$ c.
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## Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.....33c. to 35c.

## Old Metals

The market is firm. Dealers' buying prices are nominally as follows:

	Cents Per lb.
Copper, heavy and crucible.....	16.50
Copper, heavy and wire.....	15.50
Copper, light and bottoms.....	13.50
Brass, heavy .....	10.00
Brass, light .....	7.00
Heavy machine composition.....	15.50
No. 1 yellow rod brass turnings.....	9.00
No. 1 red brass or composition turnings.....	12.00
Lead, heavy .....	6.00
Lead, tea .....	4.00
Zinc .....	5.00



[illegible]